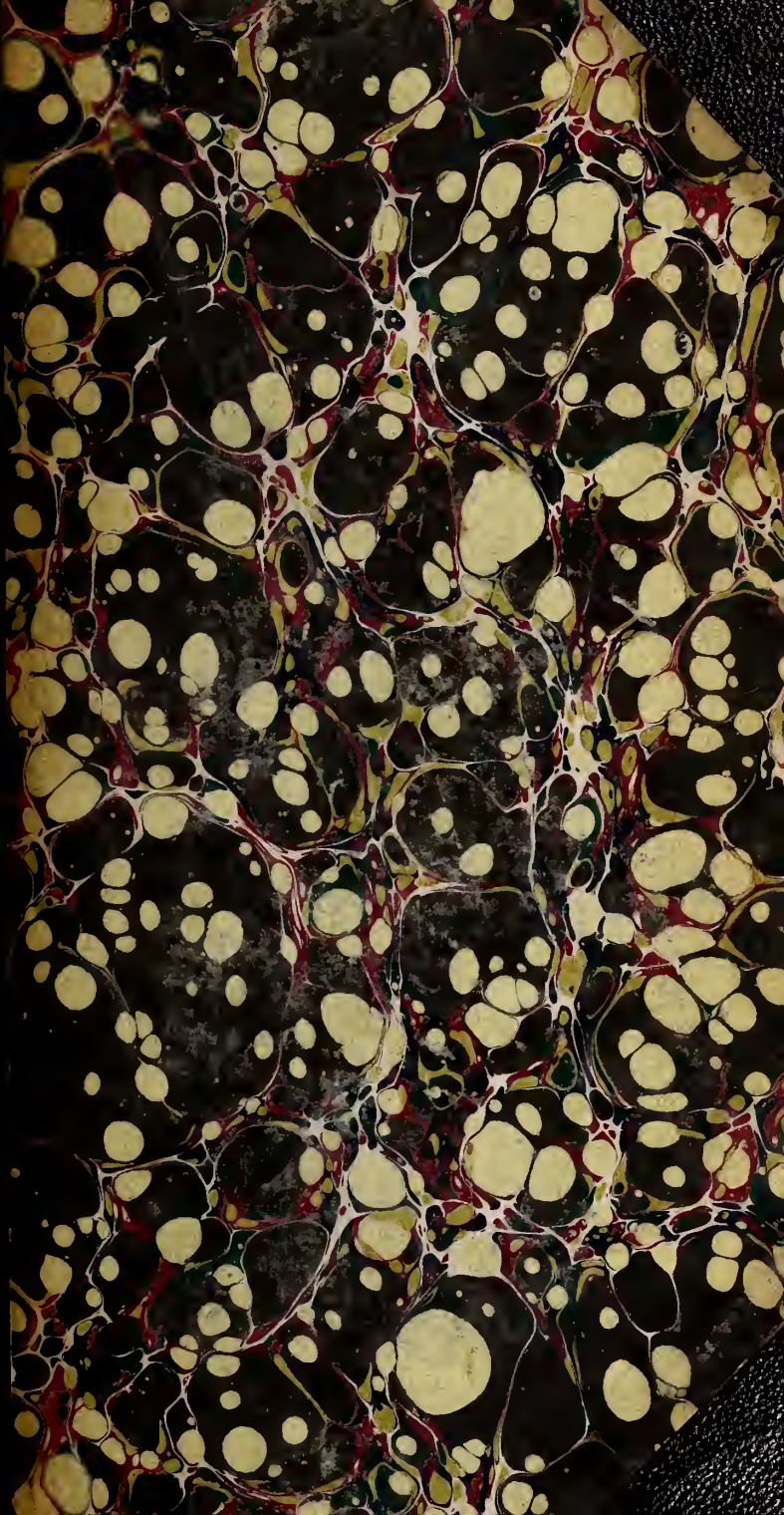

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JOURNAL

OF THE

ASIATIC SOCIETY

OF

BENGAL.

EDITED BY THE SECRETARY.

VOL. XI.

PART II. JULY TO DECEMBER, 1842.

NEW SERIES.

"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia* will commit their observations to writing, and send them to the Asiatic Society in Calcutta; it wil languish, if such communications shall be long intermitted; and will die away, if they shall entirely cease."—SIR WM. JONES.

CALCUTTA:

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1842.

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JOURNAL

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A Sixth *Memoir on the Law of Storms in India, being,* Storms in the China Seas, from 1780 to 1841. *By* Henry Piddington.

It naturally occurred to me in the course of my investigations on this subject, that it would be of great interest could we collect together as many of the *old* storms of past years as remain upon record; and with this view, I addressed the Hon'ble the Court of Directors of the East India Company, requesting their assistance in obtaining from their official documents, and from their old officers, such information as still existed. With their wonted, and well-known liberality in the cause of science this request was promptly complied with, and I owe to their kind assistance a mass of documents, comprising numerous extracts from logs and letters which relate to the China Seas and Northern Pacific,* besides other miscellaneous information. It is then, I need not say, to them that this memoir will owe, in the first place, most of its information, and I may be allowed to add, that as the best thanks which I could offer to them, I have endeavoured to use to the best advantage their valuable materials.

To Captain Chas. Biden of Madras, I am next indebted for a long series of logs and notices, which he has been most zealous in collecting and forwarding to me. And from Mr. Greenlaw, the Secretary

* The remainder to the Bay of Bengal, Southern Indian Ocean, and Cape of Good Hope, which will appear in future memoirs.

to the Marine Board, and Captain Clapperton, Acting Master Attendant at Calcutta, I have, as usual, received all the assistance they could afford: I must not omit to mention, that amongst several of the Hon'ble Company's retired officers who have given valuable notes, I am specially obliged to Mr. Thos. Packman, for some twenty pages of extracts and notices which he has been good enough to send me. I have been careful to note at the head of every storm the sources from which the documents are derived.

It will perhaps be thought that I have here preserved some records which afford but scanty proof of the truth of the theory of storms as applied to the Chinas Seas; but it should be borne in mind that we have to prove, *first*, that the great storms are circular ones, or nearly so; *secondly*, that they turn from right to left outside; *thirdly*, that they are progressive; *fourthly*, the tracks on which they move; and *fifthly*, the rates at which they move, and any other peculiarities. Now to shew all this of any *one* storm, requires a considerable body of evidence, and such as can rarely be procured without great trouble and a fortunate combination of circumstances; but we may prove it little by little, and separately, of several storms; and above all, we may shew that *as far as all available record extends, there is no contradiction to the theory to be found!* and by publishing faithfully, make the data available for abler hands. With these views then, I shall I trust be acquitted of accumulating useless details, and I may add, that provided our data are but authentic, we can as yet scarcely say what may be, eventually, their relative importance.

TRACK No. I, 1780.

The first storm of which I have obtained any record is the following, from a note of Captain Biden's:—

An account of the distress of the London East Indiaman, 758 *tons, in a Hurricane on the Coast of China, in July last, taken from Captain* Webb's *letter to the Directors of the East India Company. From the Annual Register.*—"On our arrival on the coast of China, off Macao, on July 17th 1780, after my packet was delivered to the

supercargoes there, a tiffoon came on, which had very near demolished us.

"At four in the afternoon our best bower cable parted, and the ship cast in shore, but by setting all the sail I could, I just weared her clear of the land; and as the wind was then E. N. E. we stood out to the southward under our courses, and at six had the *Ladrones* bearing N. E. At eight the wind flew round to S. E. and blew the hardest gale I ever remember. We were then in twenty fathoms water, and not being able to make any more way out, our sails all blowing to pieces, we looked upon our destruction as inevitable, without a particular act of providence; for we were driving on a lee-shore. At twelve at night the wind flew to the south, its violence still continuing, and we found the ship shoaling her water, so that every soul on board was preparing for death. At daylight we were in twelve fathoms water, with the sea, which was as much mud as water, breaking entirely over us; we then threw some of our guns overboard, and cut away the main and mizen masts, and by the time we had cleared them we were in three fathoms water, the land only about a quarter of a mile distant. We immediately cut away the fore-yard and let go the sheet anchor, which, by the mercy of God, brought us up; and as the ship touched the ground abaft it eased her to the cable, or I am well assured the *Royal George's* anchors and cables would not have held her. We then instantly let go our spare anchor with a new cable, which parted as we were veering it out, so that we had no other left. About nine in the morning the gale abated. In the evening we hove up our sheet anchor, when we found the cable stranded. What saved the ship was the having all our guns housed, her ports in, and top-gallant masts down on deck, before the gale came on. Our drift in the gale was amazing.

"I imagined it at first only about fifty miles, but to my astonishment when the gale was over, I found myself as low down as Haynan, within the westernmost island, about 3 leagues from the continent. I must have passed in the night quite close to a rock that bore S. by W. when the ship brought up. The Chinese told me that every vessel that was that night at sea perished except mine, and that they had lost all their junks and boats round the whole country, and were certain not less than 100,000 people had perished in the storm.

"We had another tiffoon in August, when all the European ships at Wampoa drove with three anchors a-head. The Chinese junks and boats then in the river were most of them sunk, and the number of poor souls that perished in this hurricane is incredible. I repaired my damages as well as I could at Canton, but I was obliged to come away with only two cables."

Captain Biden's note upon this log, is as follows: "The extraordinary drift of the *London* from near Macao to the N.E. Coast of Hainan is worthy of remark. It appears she stood to the southward about four hours when the gale flew round from E. N. E. to S. E. Allowing her to have made thirty miles in those four hours; this ship must have experienced an amazing current to the S. S. W., the distance from the Grand Ladrone to Hainan, being about 180 miles, and much of the time the hurricane was from S. E. and S."—C. B.

It seems most probable, that this was a storm travelling along the South Coast of China, or from about E. N. E. to W. S. W., and that the *London* crossed its track, and not far from the centre, at 8 A. M. I have therefore laid it down as one of the probable tracks only, though from the ship's position, and the shift of wind being so well ascertained, we may infer that we are not far from the truth. The extraordinary drift would be quite incredible, did it not also rest upon good evidence, and it should be borne in mind by the seaman as at all events a possibility in like cases. It will be subsequently seen that in September 1803, the H. C. S. *Warley* was also driven from off St. John's to the Taya Islands, or about the same distance in about 56 hours, and that other instances of this dangerous storm-current have occurred.

1793.

On the 1st, 2nd, and 3rd of Dec. 1793, the Honorable Company's Ships *Royal Charlotte, Triton,* and *Warley,* bound to China, by copies of their logs received from the India House, were driven from Lat. 20° 9′ N., Long. 119° E.; to Lat. 17° 29′ N. Long. 116° 38′ E. or about 220 miles to the Southward and Westward by a heavy

gale (called a Tyfoon in their logs) which began at North, veered to N. E. and N. N. E. and moderated again at North, veering when fine, to N. N. W. It is barely possible that this might have been a vortex travelling from the N. N. E. to the S. S. W. between the ships, and the Island of Luzon; but I should be more inclined, at that season of the year, to consider it as what I have in my former memoirs styled a monsoon gale, i. e. the monsoon of the season rising to the height of a severe gale. Of this the reader will judge for himself. There is nothing in the data worth recording beyond the drift of the ships, and the steadiness of the wind during the storm, which was however so severe, that the *Royal Charlotte* lost her tiller, and the other ships several sails, &c.

TRACK No. II, 1797.

Narrative from Captain Lynns's Star Tables.

The *Duke of Buccleugh,* (burden 1182 tons), sailed from China (Macao roads), on the 15th June 1797, in company with His Majesty's ship *Swift,* Captain Hayward, and a fleet of sixteen ships.

Sunday the 18th June.—Moderate winds from S. S. E. to E. S. E., E., E.N.E., N.E. and North at noon, with hazy weather throughout. Latitude observed 21° 58′ N.; longitude per chronometer 116° 05′ E. Barometer 29° 15′. Thermometer 83°.

Monday, 19th June.—Commenced with increasing northerly wind and hazy weather; at 4 P. M. the wind increasing rapidly. In first and second reefs, handed the main-sail, struck the royal masts, and down top-gallant yards. At 7 P. M. wind N. E. by N., increasing to a heavy gale, handed the top-sails. From 9 P. M. till midnight, the wind veering from N. E. by N. to North, N. W. to West, S. W. and South, increasing gradually the whole time, when its force was tremendous, and such as no sail, I conceive, could have endured: the foresail at this time blew out of the bolt-rope to atoms, and the ship tried under bare poles until day-break, when the wind having veered to the eastward of South, began to abate. No ship in sight since 3 A. M. when the Commodore, with whom we had been scudding, and whom

we knew by his top-light, bore E. S. E. a quarter of a mile, and suddenly disappeared. The sea during the height of the gale, (its surface being such a continued spray), it was impossible to face; it searched through the weather ports, although well lined and secured; and in the working of the ship through the weather seams, to such a degree, as was incredible. Notwithstanding the force of the wind, the sea was not near so high as in common gales of wind off the Cape of Good Hope, which I attribute to the partiality of the gale with regard to its extent, but perhaps to the extreme violence of the wind preventing the sea from forming a head. Bar. 29° 00′. Ther. 76°.

In this gale (we afterwards learned) the *Boddam* was totally dismasted, lost her bowsprit and rudder, and was towed into Macao road by the *Crescent* packet, where at anchor, this ship lost her foremast and bowsprit also. Latitude by account 22° 9′ North, Longitude 117° 3′ East.

Tuesday, 20th.—Wind from S. by E. to S.E. by S., gradually abating to a moderate breeze, with fine weather at noon, when the latitude was observed 22° 27′ N., and longitude by chronometer 117° 26′ E.

For the foregoing I am indebted to Captain Biden, and unfortunately amongst the logs from the India House, those relating to this storm are omitted, though the logs relating to two of the other storms experienced by the *Buccleugh* and fleet in the Northern Pacific have been sent me, and will appear in a memoir on the storms of that ocean. The only other record I have is a notice from memory from Mr. Baynes of Falmouth,* from which it appears, that the *Boddam* and *Chester* suffered severely in it, the former vessel being dismasted, with also the loss of her rudder. We have then to consider from this notice alone, what may probably have been the track of the storm.

Mr. Redfield in quoting this storm, seems to think that the true storm set in at North. I should scarcely think so from the terms of the log, and am inclined to take its commencement from the N. E. by N. wind, at seven P. M. when the ship drifting across the track of the storm within, a short distance of its centre, will account for its veering, taking the track to be about an East and West one.

* India House Memoranda.

There is however another and a more probable reason to account for the slight anomaly, taking the storm to have begun at noon, and from the North, as Mr. Redfield supposes, which is, that at this time the *Buccleugh* was only 50 miles from the coast of China, which being high, would, as we positively know in the case of the storms of the Bay of Bengal, occasion variations in the direction of the wind, and probably influence that of the centre itself. We cannot venture upon such slender data to mark any thing more than a conjectural track for this storm on our chart, but we may be satisfied that it travelled from the Eastward towards the West, and veered according to the Law of Storms in the Northern hemisphere.

TRACKS No. III. AND IV.—SEPTEMBER 20TH to 23RD, 1803.

Documents from the India House and Captain Biden.

On the 20th to 23d of September, 1803, a fleet of the Hon'ble Company's ships, consisting of the *Warley, Royal George, Bombay Castle, Alfred, Coutts, Earl Camden,* and *Ganges,* experienced two very severe tyfoons in the China Seas. Of these ships, the first three, viz. *Warley, Royal George,* and *Alfred,* were close in with the Coast of China, and some of them were anchored off St. John's, while the last four, *Coutts, Earl Camden, Bombay Castle* and *Ganges,* were about latitude 16° N. and thus at least 6° South of the others. We should have then consequently, as it were, two fleets on opposite sides of a great storm of 6° of latitude, or say 400 miles if it was one storm, or if there were two, the two fleets still serve to define their tracks and limits. I shall subsequently give a full detail of how they do so.

My authorities are the logs of the ships from the East India House, from Captain Biden, who was a Midshipman in the *Royal George,* and the log of that ship, with a private memorandum of Captain Torin's of the *Coutts.* I commence with the logs of the ships off the Coast of China, reducing them to civil time.

No. 1.—Abridged Log of the Honorable Company's Ship WARLEY; *reduced to civil time.*

The Honorable Company's Ship *Warley* was on the 21st September, at noon, in lat. 21° 17′ N., long. 113° 7′ E. with the land about St. John's and the Madarin's Cap in sight at sunset; blowing fresh from N. N. E. to N. by W. at midnight, when she was in twenty-five fathoms water.

22*nd September.*—From midnight to noon, wind increasing fast, ship standing in to the N. E. and East with wind as before, and N. by W. at noon, when she was in thirty fathoms water off St. John's, about lat. 21° 10′ N. long. 112° 48′ E. By 11 P. M. all the storm staysails blown away; wind apparently steady from the North and N. N. E., though not marked in this log; ship hove to with her head to the Eastward.

23*rd September.*—Storm increasing, top-masts blown away, ship becoming almost unmanageable; at a little after noon, when by indifferent observation the latitude was 21° 15′ N. they let go the best bower anchor, to try to keep the ship's head to the sea; the wind is not marked, but seems to have been about E. by S. at noon.

24*th September.*—Rolled away the mizen-mast. Saw the Taya Islands at 6 A. M. Latitude at noon 20° 15′ N.

With reference to the log of the *London* at p. 607 it will be seen, that this is another instance of a ship's being blown and drifted from the mouth of Canton river to the Coast of Hainan, in about fifty-six hours.

No. 2.—*Abridged Log of H. C. S.* ROYAL GEORGE, *Captain J. F. Timins, reduced to civil time.*

The *Royal George* was, at noon on the 22d September, at anchor, with the Grand Ladrone bearing N. by E. ¾ E. three or four miles, and the Asses' Ears E. by N., strong gales from N., with squalls and hazy weather, lat. 21° 50′ N. P. M. hard gales with squalls and fair weather. Wind N. N. E. at 5 P. M. and N. E. at 9; midnight, severe gusts of wind with rain, and a heavy swell from the N. E.

23*rd September.*—A. M. very hard gales with severe gusts of wind and rain, veering away cable.

At 2 A.M. the wind marked E. N. E. At 3, blowing very hard, cut the cable and hove to (head to the S. E.) under bare poles. P. M. wind East, strong gales with heavy squalls Southerly. More moderate from 3 P. M. At 5 P. M. St. John's bearing W. N. W. three or four leagues, in twenty fathom water.

24*th September.*—At 8 A. M. St. John's bearing N. W. six or seven leagues; Cow Cock N. E. by N., wind E. by S. making sail. The *Alfred* at daylight S. by E. five miles.

No. 3.—*Abridged Log of H. C. S.* ALFRED; *reduced to civil time.*

At noon 22*nd September,* had the Grand Ladrone bearing W. $\frac{1}{2}$ S. Gap Rock South, and Asses' Ears due East. Observed that the swell was rising from the Eastward. Wind marked North. At noon working in to the anchorage; P. M. increasing breeze and cloudy weather, with a long swell from the East. At 4 P. M. anchored with Grand Ladrone bearing S.; Gap Rock S. by E.; Asses' Ears S. 65° E. making all snug. At 11 P. M. wind increased to hard gale N. N. E. At midnight drove.

23*rd September.*—Gale still freshening, and ship driving at the rate of $2\frac{1}{2}$ knots per hour, cut and stood to sea, hove to at 2 A. M. Wind at N. E. and at 4 at E. N. E., heavy gale with hard squalls and a confused sea at noon. At 2 P. M. E. S. E. At 4 made some sail. At 7 P. M. E. S. E.

24*th September.*—*Royal George* at daylight N. by W. Wind about E. S. E. and moderating.

No. 4.—*Abridged Log of the* EARL CAMDEN, *Captain Dance; reduced to civil time.*

Wednesday, 20*th September.*—Noon lat. 15° 42′ N., longitude 113° 41′, hard gales with squally weather, wind N. N. E. at 1 P.M. At 3

N. by E. At 5 N. by W. to midnight; ship trying to the N. E. by E. but making little or no way.

21*st September.*—Constant hard gales, and thick squally weather continue with a high confused sea. 2 A. M. wind N.N.W. At 3 N. W. b N. At 9, N. W. by W., 11 A. M. N. W. hove to under close reefed main top-sail, lat. 15° 51′ N., longitude 115° 27′ E. *Bombay Castle* in company, P. M. wind W. N. W. hard squalls, thick weather, and rain throughout till midnight.

22*d September.*—1 A. M. Wind West. At Noon S. W. by S. lat. 16° 17′ N., longitude 116° 23′ E. P. M. wind S. W. by S. At 5 P. M. wind South, bore up. At 7 P. M. wind S. W. At midnight S. S. W. weather moderating since noon.

23*d September.*—Monsoon weather; wind from S. to S. S. W., ship going four and five knots to the N. by W. Noon, lat. obs. 17° 01′ North, longitude 114° 4′ E.; from which time fine weather to China.

No. 5.—Abridged Log of the H. C. S. BOMBAY CASTLE, *Capt. Archibald Hamilton; reduced to civil time.*

In this ship's log there are no latitudes or longitudes marked, but as she was for the first part of the storm within a few miles of the *Camden,* we may thus take it as corroborative of that vessel's well-kept record. The ships seem to have been driven to the Southward, (they were bound *to* China it will be remembered), by the continuance of a northerly wind, which indeed is not uncommon at this season, and may be the first struggles of that part of the trade wind which constitutes the N. E. monsoon, to overcome the South-westerly one; and thus, if we admit mere dynamical causes to originate these vorticæ, giving the first impulse to them, for by a memorandum in the log, they were on the 19*th September,* in latitude 16° 2′. The *Camden's* log giving 15° 42′ for the observation of the 26th.

20*th September.*—P. M. Wind N. N. E. strong gale and cloudy to midnight, ship under close reefed top-sails.

21*st September.*—3 A.M. N. N. W. Noon N.W. b N. preparing for bad weather, blowing very hard with violent squalls and heavy head sea. At 4 P. M. lying to under mizen stay-sail. At 6, wind NW.

22*nd September.*—7 A.M. Wind S.W. b W. Noon about S.W. b W. hard squalls. P.M. S.W. b W. at half past 3 more moderate. At 5. S.W. bore up. At 8, *Camden* N. E. 3 miles; at 10, S. W. b S. moderating as with the *Camden* to S. by E. at 7 A. M. and to midnight.

24*th September.*—Fine wind. In company with the *Camden.* At 11 A. M. on 24th, saw the *Coutts* under jury-masts, and without a bowsprit.

No. 6.—Abridged Log of the H. C. S. GANGES, *Captain Moffat, reduced to civil time.*

20*th September.*—At noon Lat. 16° 59′ N. Long. 114° 53′ E. wind N.E. by N. Hard gales, severe squalls and thick weather till midnight. Ship standing to the Eastward under treble-reefed top-sails.

21*st September.*—At 1 A.M. the wind, from the courses marked was N.½W. and N. b W. at 3, continuing till noon when veering to N.N.W. At noon hove to with wind marked N. W. b N. At 1 P.M. under storm stay-sails, the *Coutts* bearing E.S.E. Latitude by indifferent observation and by double altitudes 16° 41′. Longitude per Chron. 116° 31′ E. P.M. wind N.W. by N. drawing round at times, as appears by the log, (for the wind is not marked, and this is deduced from her coming up and falling off,) to W. N. W. By midnight wind increasing to a heavy storm. At 5 P.M. lost sight of the *Coutts.* Staysails blowing to pieces between this time and midnight.

22*nd September.*—At 6 A.M. wind about West, and at 9, W.S.W. At noon wind about S.W. by W. blowing a violent hurricane, ship lying to under the storm mizen only, weather so thick with drift and haze cannot see a ship's length a-head. Lat. double altitude 16° 17½′ longitude per Chron. 117° 17′, find the drift made by time-keeper from noon yesterday S. E. by E. ½ E. 50 miles. P. M. wind marked as S. W. blowing a violent hurricane, ship lying to under storm mizen staysail and falling off into the trough of a very heavy sea, made sail and bore away. At 4 P. M. steering N.W. to save the masts. At ½ past 5, the fore and main staysails blowing to atoms, got tarpaulins and boats' sails lashed in the weather fore-rigging to keep the ship off the wind, which however aided very little till 9 P. M. when the storm began to abate;

wind not marked, ship running N.W. 27 miles till 8 P.M. then N.N.W. 14 miles till 10, and N. by W. 13 miles till midnight.

23*rd September.*—Wind more moderate, able to steer the ship with safety, though rolling very deep. Steering North 66½ miles, till noon, wind not marked at noon, but S. E. at 1 P. M. At noon weather moderate, heavy confused sea, rolling gunwales in, Latitude 18° 58′ N. longitude by chronometer 117° 45′. Ship having made a course of N. ¾ E. 143 miles since yesterday. P. M. wind S. E. and E. S. E. At 10 P. M. a four knot breeze, the weather having cleared up.

Noon 24*th*—Latitude 20° 40′ N., longitude 117° 41′ E.

No. 7.—Abridged Log of the H. C. S. COUTTS, *Captain Torin, reduced to civil time.*

20*th September.*—Latitude noted as 16° 57′ N.

21*st September.*—P. M. when the log commences, wind marked N. W. by N., hard gales with heavy squalls and a large confused sea. At 10 P. M. wind W. N. W. under fore-sail and mizen stay-sail with head to the North.

22*nd September.*—At 5 A. M. wind West, hard squalls. At 6, marked W.S.W. and at 7, S.S.W. In the observations it is said that at 9 A.M. the wind shifted to the S.W. and moderated until near noon, when it came on to blow again very hard with heavy squalls and rain. No observation or account marked in the log. 1 P. M. wind S.S.W. hard gale increasing to a most violent tyfoon with rain, *lightning,** and a large confused sea. At 4 P.M. the wind S.S.W. weather fine, shrouds giving way, bore away to save the masts, lost fore-topmast; 7 P.M. lost fore-sail and broached to. At 8, main topmast blew away, at 9, lost the main and mizen masts. At 10, wind marked as South, and at 11, S. by E. Lost the bowsprit.

* The only instance in which lightning is marked in any of the logs of this storm, and therefore probably the only instance in which it occurred; for seamen rarely omit noticing it, particularly in heavy weather, to which it gives such an awful appearance.

23*rd September.*—2 A. M. lost the spare and stream anchors. At 3, the foremast fell into the waist. At daylight moderate; clearing the wreck, and by noon kept on her course under a jury mast. Latitude observed 18° 08′ N. Longitude by Captain Torin's private journal 117° 14′, Wind S. by W. at 1 P. M. when moderate breezes and fair weather. Wind S. S. E. at 10 P. M. and till midnight.

24*th September.*—At ½ past 8, saw two sail to the South, *Camden* and *Bombay Castle.* At noon one ship, *(Camden)* two miles astern. Latitude observed 18° 51′ N. Longitude 116° 52′ E.

To place our deductions from the valuable records of this storm, or storms, in a clear light, I shall preface them, as in my former memoirs, with a synoptical table, shewing for each day the relative positions of the ships, and briefly the weather they experienced.

Tabular View of the Tyfoon of 20th to 23d September, 1803, in the China Seas.

Date, Civil time.	Ship's Name.	Winds and Weather.	Lat. N.	Long. E.	Remarks.
			° ′	° ′	
Noon 20th, Sept. 1803.	Earl Camden, ..	N. N. E. hard gales and squally, ...	15 42	113 41	Increasing and veering to N. by W. by midnight and N. W. by noon on 22d.
	Bombay Castle, ..	N. N. E. strong gales and cloudy.	15 42	113 43	In company with the Camden, winds the same. Lat. on 19th 16° 2′ N.
	Ganges, ...	N. E. by N. hard gales Noon squalls and thick weather, ...	16 59	114 53	Standing to the eastward, wind veering to N. ½ W. by midnight, and N. N. W. by noon next day. Coutts in company.
	Coutts, ...	.. .. ..	16 57	.. ..	No Log for this day, but in company with Ganges.
	Warley, ... Royal George, .. Alfred, ...	Fine weather, ...	.. ..	.. ..	No Logs for these days, the storm not having commenced with these ships, which were standing in for the Coast of China.
Noon 21st Sept. 1803.	Earl Camden, ..	N. W. hard gales, thick squally weather and high sea, ...	15 51	115 27	Wind veering to W.N.W. P.M. and to the westward A.M. 22nd; Bombay Castle in company at noon. Hove to under close reefed main topsail.
	Bombay Castle ..	N. W. by N. blowing very hard with violent squalls,	.. ..	.. ..	In company with the Camden.
	Ganges, ...	N. W. by N. hard gales, thick weather and rain,	16 41	116 31	Noon hove to under storm staysails, wind drawing gradually more westerly & increasing. Coutts incompany till 5 P. M.
	Coutts, ...	N. W. by N. The same weather and position, ..	.. ..	.. ..	10 P. M. wind W. N. W.
	Warley, ...	N. N. E. to N. by W. At midnight blowing fresh,	21 17	113 7	Working in towards the Coast of China.
	Royal George, .. Alfred, ... :	No log for this day, .. No log, ...	.. ..	.. ..	These two ships I suppose had fine weather with a fresh breeze, as their logs of 22nd begin with the same.

Date, Civil time.	Ship's Name.	Wind and Weather.	Lat. N.	Long. E.	Remarks.
			° ′	° ′	
Noon 22d, Sept. 1803.	Earl Camden, ..	About S. W. storm continues, ...	16 17	116 23	Hove to under storm staysails. Wind has drawn from West at 1 A. M. to SWbS. at noon and South, at 5 P. M. W. S. at 7 after bearing up, and midnight S. S. W. Moderating since noon.
	Bombay Castle, ..	About S. W. by W. the same, ...	.. ..	.. ..	Noon, Camden East 3 miles; at 5, bore up, wind S. W. and S. by E. at daylight.
	Ganges, ...	About S. W. by W. blowing a violent hurricane, thick weather, ...	16 17½	117 17	Excessively thick weather, wind has veered from West at 6 A. M. to S. W. by W. at noon & S. W. P. M., Bore up at 4 P. M. to save the masts.
	Coutts, ...	About S. W. by W. increasing to a violent typhoon.	.. ..	near the Ganges till 4 P. M.	Rain and lightning; 4 P. M., bore away N. N. W. ½ W. with wind S. S. W. ship dismasted by midnight.
	Warley, ...	N. by W. increasing fast,	.. ..	.. ..	By 11 P. M. all the storm staysails blown away.
	Royal George, ..	North, strong gales, ..	21 50	.. ..	At anchor off the Grand Ladrone P. M. increasing fast. Wind N. N. E. at 5 P. M.; N. E. at 9 and to midnight.
	Alfred, ...	North, ...	.. ..	.. ..	Grand Ladrone W. ½ S. swell increasing fast from eastward, working into the anchorage. 4 P. M., anchored 11 P. M. hard gale N. N. E.
Noon 23d, Sept. 1803.	Earl Camden, ..	S. to S. S. W. fine, S.b E. at noon, ...	17 01	117 12	Steering to the North 4 and 5 knots.
	Bombay Castle, ..	As with Camden, ...	.. ..	.. ..	
	Ganges	About S. E. moderate, ..	18 58	117 45	Very heavy and confused sea P. M. wind S. E. and E. S. E.
	Coutts, ...	S. by W. at 1 P. M. moderate,	18 8	117 14	Veering to S. S. E. at 10 P. M.
	Warley.	About E. by S. (but not marked) blowing very hard,	21 15	.. ..	Furious gale, topmasts blowing away, and anchors washed overboard; P. M. veering to S. Eastward.
	Royal George, ..	About East or E. b N. (1 P. M. East) the same weather.	.. ..	.. ..	Strong gales, but moderating from 3 P. M.

Date, Civil time.	Ship's Name.	Wind and Weather.	Lat. N.	Long. E.	Remarks.
			° ′	° ′	
Noon 24th, Sept. 1803.	Alfred, ...	About E. by S. (E. S. E. at 2 P. M.)	.. ..	.. ..	Strong gales, at 4 P. M. made sail.
	Earl Camden, Bombay Castle,	Fine, all sail set, ...	18 48	116 9	
	Ganges, ...	Fine, the same, ...	20 40	117 41	Sea very irregular, steering to the N. N. W. since daylight.
	Coutts, ...	Fair, light winds from S. E., E.S. E.	18 51	.. .	
	Warley, ...	Just making sail. Wind not marked, supposed S. to S. S E.	20 15	.. ..	
	Royal George, .. Alfred, ...	Fine, ...			

I now proceed to the deductions to be drawn from the foregoing documents, but before I do so, I should remark, for the information of those unacquainted with the fact, that the East India Company's China ships were, though merchantmen, vessels of from 12 to 1400 tons, mounting upwards of thirty guns, with crews and officers in proportion, and these last in their day, men of the first acquirements and talents in their profession. When we find, therefore, that such ships, well found and managed as they were, suffered so much from the storm, we must recollect that their logs express pretty nearly what a good Frigate or sixty-four gun ship of the old times, would have found it: Weather in which smaller merchant vessels would have been reduced much sooner to bare poles.

It is evident from the inspection of the tables, that one of the storms was travelling from the South-eastward to the North-westward, for it began on the 20th with the *Camden*, *Bombay Castle*, *Ganges*, and *Coutts* close to the Eastern edge of the Macclesfield bank, six degrees South of the entrance of Canton river, while near the Coast of China, the ships were standing in for it with fine weather.

The table of the 20th, it will be seen, gives two directions of the wind for the Southern storm, N. N. E. for the *Camden* and *Bombay*, and N. E. by N. for the *Ganges*. Taking these as tangents, and projecting carefully for the centre of the storm from the ships' positions, they will be found to place it about the Island of Mindoro, or S. E. by E. $\frac{1}{2}$ E. of the ships, distance 380 miles. Perhaps the centre was not really so far off, as, the angle being so acute, considerable error may occur, but this is quite evidence enough to show, that the storm *did* commence to the E. S. E. of this part of the Fleet. I have not therefore marked a centre for this day, but carried the Track from that quarter.

On the 21st, there was still fine weather on the Coast of China, but with the southern division of the fleet, the storm by noon was so heavy as to bring them under close reefed top-sails with top-gallant masts and yards down, and all other preparations for bad weather. It should be noticed that these four ships of the southern division form again two smaller divisions. The *Camden* and *Bombay Castle* together, being just to the Eastward of the Macclesfield, and the *Ganges* and *Coutts*, also in company with each other, about eighty miles to the E. N. E.

of them. The winds marked in these ships' logs* both place the *centre* to the N. E. b E. of them, and as we have no cross bearing by which to lay down the distance of it, we can only do so by judging of the force of the wind, and its veering; which with the ship farthest to the Eastward, the *Ganges,* (for we have not the log of the *Coutts* for this day, though we know she was in company with the *Ganges*) was not quick; the wind having remained about N. W. by N. from midnight. Allowing then for the ship's drift, and for the increasing violence of the storm on the 22d, I have placed the centre at noon this day in latitude 17° 36′ N. longitude 118° E.

For the 22d, we find, that to midnight on the 21st, and to 5 A. M., on the 22d, and with the *Ganges* and *Coutts,* the wind held steady to the N. W. when it drew round to West and S. W. at noon. The log of the *Bombay Castle* shews nearly the same veering, but that of the *Camden,* marks the wind at West at 1 A. M.; and the *Bombay Castle,* from her coming up to N. N. W. at 3 A. M., appears to have had the wind also not far from West at this time, though both ships' logs agree nearly enough at noon; when the *Camden* seems to have had it S. W. by S., and *Bombay* about S. W., *Ganges* about S. W. and *Coutts* S. S. W. as far as can be judged from their logs. The drift of these two last vessels is laid down for the twenty-four hours between noon, 21st and 22d in the *Ganges*' log, which is most carefully kept,† as S. E. by E. ½ E. fifty miles.

* I may notice here in strong corroboration of many of my remarks in these memoirs, the difficulty of analysing a storm from the direction of the wind considered as a tangent line to the supposed circle of it, and the ship's position as the point at which the tangent touches the circle. Thus we have, in the logs of the *Camden* and *Bombay Castle,* within three miles of each other, the wind marked as follows: for the 21st *Camden* at 2 A.M. N. N. W., *Bombay Castle* at 3, N. N. W. *Camden* at 3, N. W. by N. *Camden* at 9, N. W. by W.; at 11 N. W. *Bombay Castle* at noon N. W. by N. and at 1 P.M. N. W. by N. *Camden* at 1 P.M. W. N. W. *Bombay Castle* (hove to) at 6, wind N. W. aud so forth. It is clear that these variations arise partly from carelessness, and partly from errors in judgment in such severe weather. I shall perhaps be told here that I am looking for mathematical exactness where none can exist. I am, I own, seeking for all the exactness which can be obtained, and I desire that all our evidence should be fairly brought forward on this most important question, that it may be impartially weighed by all as well as by ourselves, and that we may not be said to have assumed any thing without giving our grounds for so doing.

† With the exception of the direction of the wind which is very frequently omitted either in the log, or by the copyist.

Now this circumstance of the wind holding steady to the N. W. for seventeen hours, and then veering rapidly, or within about eight hours, the remaining eight points, or a point an hour, till it reached the S.W. is worthy of note; particularly if we look at the drift of the vessels to the E. S. E. and N. E., according to their logs, (though in these there are some slight discrepancies and omissions, and some apparent assumptions,*) and remark the increased violence of the wind before and after noon on this day, shewing either that the storm had been really now forming, or stationary, or curving as I have laid it down. Giving this every consideration I cannot avoid concluding, that the storm, which had apparently come up from the S. E. by E., under the lee of the island of Luconia, having arrived opposite the great opening to the Pacific Ocean curved to the Westward, as I have marked it, in its progress over to the entrance of the Gulf of Tonkin; influenced perhaps by the prevalence of a N. E. wind from the Pacific. The circumstance of its altering its direction so considerably from that which it had under the lee of the very high land of Luzon, is not more extraordinary than the curves which, we know, occur in the Western hemisphere, and some about the Isle of France in our own. The storm indeed may have been really a Pacific Ocean storm, forcing its way across Luconia, from the coast of which the ships were but little more than 200 miles distant? If this was the case, we may suppose the anomaly easily accounted for. I have then, on these considerations, marked the centre for the 22d, as in latitude 17° 20′, longitude 115° 16′ E. and bearing N.W. by W. ½ W. from the *Ganges* and *Coutts*, (which had the wind from S. W. by S. and S. S. W.) and N. W. from the *Camden* and *Bombay*, which had the wind S. W. by W. and S. W. by S. We have still the anomaly, that the *Coutts* and *Ganges*, seem, by the expressions used in the logs, to have had the wind more violent than the *Camden* and *Bombay*, but I suspect that these latter ships were really much farther to the S. E. than their positions shew, for the wind was from W. N. W. and West the

* Such as longitude marked "by chronometer" on the noon of the 22d. In weather like that then prevailing very little dependence can be placed on sights for chronometer or double altitudes, for it is said, "at noon blowing a violent hurricane, weather so thick with the haze and drift cannot see a ship's length a head. What is meant is probably the chronometer brought on by dead reckoning, but this should be noticed.

greater part of the twenty-four hours, and their drift made good in such weather, could scarcely be better than East at most. I have however given the evidence as it stands.

For the centre of the 23d we find that the *Coutts,* bearing up with the wind at S. S. W. a little after noon on the 22d, was utterly dismasted by the violence of the hurricane, by 4 A. M. on the 23d, and that at daylight it was moderating. She steered N. N. W. ½ W. when she bore up, and ran for 31 miles on this course before she broached to. The centre of the hurricane bore at noon 22d, as we have shown, about N. W. by W. ½ W. from her, and it was certainly travelling to the westward, so that the *Coutts,* steering N. N. W. ½ W. and drifting when dismasted between W. S. W. and W. N. W. was pretty nearly *chasing* it! and its rate of travelling does not seem to have been high. The *Ganges* also bore away, but two hours later, and she fortunately did not reach so far towards the centre as the *Coutts.* The storm, as I have remarked, does not seem to have moderated till about day-light, on the 23d, with the *Coutts,* while it moderates at 9 P. M., on the 22d with the *Ganges.* I have taken the centre of this day, the 23rd, to be in about lat. 17° 40′ N., long. 112° E.

The *Camden* and *Bombay Castle* also bore up about 3 P. M., but as they were going only four-half and five knots, and had the weather moderating from that time, they may almost be considered as out of the storm.

If we now refer back to the table and logs, we shall find that between noon and midnight of the 22d, the wind on the Coast of China was setting in for a gale there, which may be fairly said to have begun at 10 A. M. on the 22d, with the *Warley,* which ship was then about on the meridian of St. John's, in thirty fathoms, or twenty five miles off shore.

She had the wind at N. by W., and with but little variation it continued to hang about thus, or North, (judging from her coming up and falling off,) till 4 A.M. on the 23d.

With the *Royal George,* at anchor under the lee of the Grand Ladrone, it also may be said to have commenced at the same time. She marks the wind at North, and the *Alfred,* at anchor farther in amongst the shelter of the Islands, had the swell rising from the

Eastward, and the wind North increasing to hard gale at N. N. E. at midnight, when she cut and stood to sea.

With every allowance for the effect of the high land on the vortex, we cannot I think suppose this storm to be the same, which was also at noon on the 22d blowing with such fury from S. W. by W., as to dismast the *Coutts*, &c. a few hours later; for the centre of the southern storm by 3 P. M. must have been bearing S. by E., at most, if not South from the Grand Ladrone, which, if the storms were the same, would make the wind *East* then; and it was not even E. N. E. with the *Alfred* and *Royal George*, till about 3 A. M. on the 23d, or 15 hours later! I think this a convincing proof that there were two storms, and have therefore laid down two Tracks for them, taking the northern storm to have travelled from the N. 62° E. to the S. 62° W. at about 60 or 70 miles distance from the coast, which will be found to agree well with the logs of the ships, though there may be some discrepancy with that of the *Warley*, but, first, we can only guess at the wind, from her coming up and falling off, next she was nearly or quite unmanageable, and lastly she was half embayed in the gulf between the N. E. point of Hainan and the coast of China, where the storm must have felt the effect of the high land on both sides.

The rate of travelling of these two storms is next to be considered. We can hardly assign any fixed centre for the Southern storm on the 20th, though we know the direction in which it lay, those of the 21st, 22nd, and 23rd, however, are sufficiently ascertained, I think, for us to suppose that the storm may have travelled about 150 miles between the 21st and 22nd, and about 180 miles between the 22nd and 23rd. We may allow a mean rate of about seven miles per hour, or 168 miles in the 24 hours, for these two days.

For the Northern storm we can scarcely assign any rate, for the distance of the centre on the 22nd is quite uncertain, as it is also on the 24th, so that we have no data for it. Taking about the same rate, as that of the Southern storm, or 168 miles per day, it will however, be seen, that this is not an improbable one for it.

I trust that those who may have followed me in this, perhaps somewhat prolix, detail, will remember, that I have given it for the purpose of showing how I have taken the evidence before us; for

we have no right to lay down tracks for storms, however well *we* may be satisfied that they are not far from the truth, without also shewing, for the use of others, how we arrive at our conclusions. Both storms tending as they evidently did to the Southern entrance of the Gulf of Tonkin, formed there on their South-western quadrants one of the "heavy N. W. storms blowing out of the Gulf of Tonkin," of which Horsburgh speaks. There were no Barometers apparently with any of these ships.

TRACK No. V.—1809.

The True Briton's *Storm.*

Documents from the India House.

On the 28th and 29th September, 1809, the Hon'ble Company's ships *True Briton, Scaleby Castle, Cumberland* and *Neptune,* experienced a tremendous tyfoon, between latitudes 20° and 21° North, and longitudes 113° and 114° East, or about 100 miles from the Coast of China, in which the *True Briton* foundered, and the other ships experienced severe damage. I abridge here, first, the logs of the ships, and then, placing them in the tabular form, shall make a few observations to explain the deductions from which I have laid down the Track of the storm.

Abridged Log H. C. S. Cumberland, *Capt. Wedderburn, reduced to civil time.*

27*th September.*—At noon in latitude 19° 47′ N., mean longitude of the fleet 114° 43′ E. Light airs from N. N. E. to West till midnight; the fleet in company. Much lightning to the Westward. Standing to the Northward; wind West at midnight.

28*th September.*—At 9 a. m. wind from N. N. W., fleet standing to the North Eastward, four and five knots. At noon, latitude by account of the fleet 20° 51′, longitude of the fleet 114° 54′ E. Barometer 29.13. Thermometer 81°, freshening, cloudy and squally. p.m. a very hard gale from N. N. W.; veering at 9 p. m. to N. N. E. blowing during the night, "with inconceivable fury;" the boats, the fore-sail and other sails blowing away piecemeal at midnight.

29*th September*.—Weather continuing, lost the small bower anchor, ship under bare poles at 2 A. M. At 10 A. M. wind S. E. At noon latitude 20° 33′, longitude 114° 54′. Barometer 28.65. Thermometer 81°, P. M. wind E. S. E., at 11, East.

30*th September*.—Moderating apparently about midnight, but the log very imperfectly kept. 9 A. M. wind S. E. by E. Noon latitude 20° 58′ N., longitude 112° 15.′ Barometer 29.20. Thermometer 79°.

1*st October*.—"No observation," is the only record given for this day, by an oversight of the copyist no doubt.

Abridged Log of the H. C. S. SCALEBY CASTLE, *Captain John Loch, reduced to civil time.*

27*th September*, 1809.—At noon in latitude 19° 48′, mean longitude 114° 43′. 5 P. M. light airs and calm at midnight.

28*th September*.—A. M. "the weather with rather a threatening appearance, though the Barometer has not fallen a great deal." At noon it is remarked again: "The Barometer fell in the last 12 hours from 29.85 to 29.50, but after the gale commenced, it fell very fast." At noon lat. 20° 55′ long. 114° 54′, wind N. N. W. P. M. N. N. W. to N. b E. at 10 P. M. From noon the gale freshened with squalls; by 2 P. M. a fresh gale, 5 P. M. blowing very hard, and by 9, "a most tremendous hurricane." At midnight boats and sails blowing away, wind marked N. E. by N.

29*th September*.—1 A. M. wind East, at 5 E. S. E., at noon not marked. Of the Barometer it is said: "The Marine Barometer began "to fall fast after 4 P. M. but before that it was not very low. Towards "midnight it had fallen to 28.30, where it continued for near 24 hours. "This was the lowest I ever saw the Barometer. The hardest of the "gale was about 2 A. M. Noon lat. account 20° 26′, long. account "114° 37′ E., wind E. S. E." Violent gale still continuing with a high sea, but began to moderate towards noon. At 5 P. M. saw a ship bearing East, with loss of mizen-mast and fore top-mast, which is supposed to be the *Neptune*. Wind E. S. E., At midnight hard squalls, ship lying to; wind S. E. since 9 P. M.

30*th September*.—Wind S. E. at day-light, and till noon. "The Barometer began to rise after daylight." Noon, latitude account 20° 21′

longitude chronometer 111° 34′, shewing *a difference of* 111 *miles! from the longitude by account.*

1*st October.*—No log given.

Abridged Log of the H. C. S. NEPTUNE, *Captain W. Donaldson, reduced to civil time.*

27*th September.*—Noon latitude 19° 51′; in company with the fleet, winds variable and calm at midnight.

28*th September.*—At 4 A. M. lightning to the N. W., at 6 W. N. W., at noon no observation, but latitude and longitude nearly that of the other ships being in company. At noon a fresh breeze with thick rainy weather, increasing at 1 P. M. to a fresh gale N. N. W. At 5, hove to under storm stay-sails, wind North. At 6, the fleet pretty close, dark gloomy weather, gale increasing fast, with a heavy cross sea striking the ship very hard; at half-past eight, lost the mizen mast, wind about N. E. at midnight.

29*th September.*—At 4 A. M. wind East with violent gusts; at 6, E. S. E. lost fore topmast, got the main yard on deck; at noon wind about S. E. by E. Noon no observation. P. M. wind S. E. by E. Hard gales, thick weather and high sea; all hands at the pumps; at 10 P. M. wind S. E. to midnight.*

30*th September.*—A. M. wind S. E. at 10 S. E. by S., ship on her beam ends throughout the storm. Noon no observation. P. M. S. E. hard gales till midnight, when moderating.

1*st October.*—8 A. M. wind S. E. wore and made some sail at daylight; 12 hours log only given. At noon, latitude by indifferent observation 20° 48′ N.

A letter from J. B. Burnett, Esq. a Midshipman in the *Scaleby Castle* at the time of this storm, is also added to the documents from the India House, as follows. It is dated Monboddo, 6th November, 1841:—

"The account of that remarkable tyfoon, in which the *True Briton* perished, lies before me. I was then a Midshipman in the *Scaleby Castle;* the *True Briton, Neptune,* and *Cumberland* in company. At

* The *Neptune's* Barometer is not marked in the extract sent me, but we learn from Horsburgh, vol. ii. p. 267, that it fell in this storm from 29.85 to 28.30.

noon of the 28th September, 1809, civil time, we were in lat. 21° N., and long. 115° E. nearly, and in 64 fathoms water, running for the Lema Channel. After noon, the barometer, already low, fell fast, and the gale came on rapidly, beginning at the N. N. W., and gradually veering round towards midnight to N. N. E., at which time it attained its greatest fury, and blew a hurricane. At 4 A. M. it veered round to East, and very gradually to E. S. E., and last of all to S. E., at which point it moderated, after continuing with great violence for nearly 48 hours. I do not remember whether it was on the full or change of the moon. The sky was dark and lowering, and the drift of the sea so thick and heavy, that we could see nothing, and lay like a log absolutely helpless. The force of the wind may be inferred from the fact, that the bights of our main top-mast staysail were blown away from between the turns of the gaskets, and small double pieces of canvas out of the clues of the topsails, as they hung below the yards. The *True Briton* was never more heard of, and the other ships were all more or less roughly handled."

I now give the tabular view as before, and then the grounds upon which I have assigned the track laid down.

Tabular View of the Tyfoon of 28th to 30th Sept. 1809 in the China Seas.

Date.	Ships' Names.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Ther.	Remarks.
			° ′	° ′			
Noon 27th Sept. 1809.	H. C. S. Cumberland,	Light airs N. to West till midnight, ...	19 47	114 43	..	..	Much lightning to the Westward.
	Scaleby Castle, ..	The same, ...	19 48	114 43	..	..	The fleet in company.
	Neptune, ...	The same, ...	19 51	114 43	..	..	
Noon 28th Sept. 1809.	H. C. S. Cumberland,	N. N. W. at 9 P. M. hard gale N. N. W.	20 51	114 48	29 13	81	Gale veered at 9 P. M. to N. N. E. At midnight boats blown away piecemeal.
	Scaleby Castle, ..	N. N. W. P. M. N. N. W.	20 55	114 48	..	..	Bar. fell in 12 hours from 29.85 to 29.50, but afterwards very fast; by 9 P. M. tremendous hurricane, midnight N. E. by N.
	Neptune, ...	The same, ...	20 53	114 48	..	..	1 P. M. N. N. W. 5 wind North, ½ past 8 lost the mizen mast, N.E. at midnight—N. B. the fleet had now separated.
Noon 29th Sept. 1809.	H. C. S. Cumberland,	10 A. M. S. E hurricane,	20 33	114 54	28 65	81	P. M. E. S. E. at 11 East, lost small bower.
	Scaleby Castle, ..	1 A.M. East, 5 E.S E. Noon E. S. E. hurricane 5 P.M. E. S. E., 9 S. E.	20 26	114 37	..	..	Bar. 28.30 at midnight, began to moderate towards Noon.
	Neptune, ...	4 A. M. East, 6 E. S. E. Noon S. E. by E. and S E. midnight.	.. ..	.. ..	..	..	Lost fore-topmast.
Noon 30th Sept. 1809.	H. C. S. Cumberland,	9 A. M. S. E. by E. moderating.	20 58	112 15	29 20	79	
	Scaleby Castle, ..	S. E. at Noon, and from daylight.	20 26	111 34	..	..	Barometer began to rise after day-light.
	Neptune, ...	A. M. and P. M. hard gales, ...	No Obs.	No Obs.	..	..	Ship on her beam ends, but moderating a little at midnight.
Noon. 1st Oct. 1809.	H. C. S. Cumberland,	No log, ...	.. ..	.. ..	..	..	
	Scaleby Castle, ..	No log, ...	.. ..	.. ..	..	..	
	Neptune, ...	8. A.M. S. E.	20 48	.. ..	..	..	10 A. M. Wore, *Scaleby* to the North.

For the first part of this storm we may speak of the fleet as one ship, being closely in company. I shall latterly, of course, separate my remarks, as the ships themselves were separated. It appears from the logs that from noon to midnight on the 27th, they made a little Northing with the variable winds, and on the 28th, from midnight to 4 P. M. when they hove to, they were going from two to six knots to the north, making a difference of latitude of 64 miles in the 24 hours, but no Easting. This northing was an important circumstance, for the storm had fairly commenced at daylight on the 28th, when the remark in the *Scaleby Castle's* log is, "A. M. At this time the weather had rather a threatening appearance, but the Marine Barometer had not fallen a great deal." The wind was at N. N. W. and N. by W. at 9 A. M. with the *Cumberland,* and it is marked at N. N. W. at noon, with all three ships. We may thus take the centre of the hurricane to be bearing E. N. E. from the fleet at this time: we have no means of ascertaining at what distance.

From about 4 P. M. on the 28th, the ships were lying to on the larboard tack in a severe gale rising to a hurricane, with the wind veering from this time, when it was N. N. W. to N. by E. and N. N. E., and N. E. by N. At midnight N. E., then East and to E. S. E. by 5 P. M. with some, and finally S. E., by noon on the 30th with them all. Some variations as to the times of veering occur of course, for to say nothing, in such weather of log board and of copying inaccuracies, the ships were now separated. We may however say, that in the 44 hours between 4 P. M. 28th and noon of 30th, the wind veered from N. N. W. to S. E. or 14 points; or a point in 3 hours. It was then clearly a hurricane passing close to the southward of the fleet, which was drifting back to the Southward, South-westward, Westward and North-westward, or round the curve of its North-western and North-eastern quadrants, and from its extreme fury, their position with respect to its centre, as above stated, and the fall of the Barometer to 28.30, where it remained for 24 hours according to the *Scaleby's* log, we may safely suppose that they were at no great distance from the centre of it, and the unfortunate *True Briton* being probably a more leewardly vessel, was carried farther to the South by

the Northerly part of the gale,* and therefore near to or *into* the centre.

I have therefore marked for this storm a track from N. 60° E. towards S. 60° W., or about N. E. by E. to S. W. by W. and between the Pratas Shoal, and the edge of soundings, which will allow the ships to have been about 50 miles from the centre of it. The curious circumstance of the great Westerly drift again occurs in this as in the *London* and *Warley's* storms, shewing clearly that the storm wave, or storm current was carrying the vessels with it with great rapidity. The *Scaleby's* log it will be noted, says 111 miles between noon of the 28th, and noon of the 30th, or 48 hours. They undoubtedly made every allowance before coming to this conclusion, and their chronometers were corrected, if any error existed in them, by their arrival in a few days in China. The impression there evidently was, that the *True Briton* might have been lost by this current carrying her on to the Coast of Hainan, or amongst the shoals in the strait between Hainan, and the Coast of China;† for we learn from Horsburgh, p. 328, vol. ii. that in April 1810, Captain D. Ross, then surveying the China seas, was sent down to the Coast of Hainan in search of her. I shall notice more at length this remarkable current at the conclusion of these memoirs.

TRACK No. VI.

Tyfoon of 20*th to* 30*th September,* 1810.

Documents from the India House.

On the 28*th to* 30*th September,* 1810.—The *H. C. S. Arniston, Wexford, Alfred, Winchelsea, Elphinstone, Woodford,* and *Cuffnells,* bound to China, experienced a severe tyfoon in the China seas. The following are the abridgements of their logs:—

* Every seaman is aware how some vessels, in a fleet both Merchantmen and Men of War, though holding a good wind in average weather, will become much more leewardly than others, when the force of a storm depresses them beyond a certain bearing.

† The ships in this storm were all drifted close to these Shoals, as will be noted by their latitude and longitude on the 30th.

Log of H. C. S. ARNISTON, *Captain S. Landon, reduced to civil time.*

At noon, 27th September, 1810.—Latitude 17° 43′ N., long. 115° 9′ E. P. M. moderate breeze E. N. E., and hazy weather, at 3 P. M., wind N. E. At midnight strong breeze from N. N. E. with a heavy swell from the N. E.

28th September.—Increasing from the same quarter, ship by noon under storm staysails, latitude by account 17° 6′ N., longitude 115° 4′ E. P. M. very threatening sky and blowing very heavy; high sea rising, wind N. by W. to North till midnight.

29th September.—After midnight "wind veering round to the South." At 3 P. M. wind about N.N.W. by 4 about West, by 5 about S. S. W., from daylight to noon blowing most violently from South and S. S. W., with a prodigious high sea running, 6 A. M. wind marked S. by W. Noon no observation. 1 P. M. wind South, gale moderating and sea falling. At 10 P. M. wind S. E. On the following morning at daylight bore up and made all sail.

Log of the H. C. S. WEXFORD, *Captain W. S. Clarke, reduced to civil time.*

26th September, 1810.—Latitude 17° 13′ N., longitude not given, but nearly that of the fleet with which she was in company. 1 P. M. wind N. E. by N. Heavy clouds, squalls and rain. 2 P. M. thickening sky to the East, squally and unsettled from this to sun-set, *when it began to disperse.* 8 P. M. wind N. E. Lightning and thunder to the Northward, *the night fine* and moderate.

27th September.—A. M. Easterly wind with hazy weather E. by N., at 7 E. N. E., fleet standing to the northward against a heavy head swell which occasioned them to pitch deep at times. Noon latitude 17° 41′ N., longitude (of the fleet) about 115° 11′ E.* P. M. wind E. N. E. hazy weather, 5 N. E., 7 N. E. by N., blowing fresh with small rain, preparing for a gale; heavy head sea.

28th September.—2 A. M. wind N. by E. Squally and increasing. Noon N by W. latitude 2 alt. 17° 6′ N., longitude 115° 58′ E. Fleet

* The mean of 4 ships not greatly differing. The Chronometer of the *Cuffnells* is omitted in the average as being evidently 30 miles too far East; she was closely in company.

much scattered. P. M. wind North. 3 P. M. hove to under storm staysails, 5 wind N. N. W. Hard gale with very hard squalls till midnight, when about N. by W.

29*th September*.—2 A. M. N. W. by N., 4 N. W., by W., 5 S. W. and at noon S. S. W., heavy seas breaking over the ship from daylight till noon, "when it blew a perfect hurricane." P. M. wind South, hove to under trysail. Wind about South till midnight, when moderating.

30*th September*.—Bore up and out all reefs at daylight. Noon, latitude 18° 24′ N.

Abridged Log of the H. C. S. ALFRED, *Captain Welstead, reduced to civil time.*

26*th September*, 1810.—Noon, latitude and longitude that of the fleet. Variable winds from N. E. to N. W. till midnight.

27*th September*.—To noon letting out reefs. Lat. 17° 45′, long. of the fleet 115° 12′. Bar. 29.95. Ther. 81°. P. M. N. E. by E. hazy; high sea from N. E.

28*th September*.—1 A. M. wind N. N. E. At 11 A. M. North, preparing for bad weather. Noon latitude 17° 27′, longitude of the fleet 116° 0′ E. Bar. 29.65. Ther. 82°. P. M. Wind N. N. E., 3 P. M. hove to, increasing storm till midnight. Wind veering to the South.

29*th September*.—A. M. Severe tyfoon. 5 A. M. wind marked S. W. and at 8 S. S. E. Saw a ship (supposed the *Elphinstone*) bearing away before the wind. Noon blowing furiously from South. Lat. account 17° 31′ N. Bar. 29.575. P. M. S. S. E., strong gale till midnight, moderating at 7 P. M.

30*th September*.—At daylight made sail with wind at S. W., noon latitude 18° 30′, longitude 116° 30′. Barometer 29.875.

Abridged Log of the H. C. S. WINCHELSEA, *Captain The Hon'ble Hugh Lindsay, reduced to civil time.*

26*th September*, 1810.—Latitude 17° 33′ N., longitude 115° 16′ E. variable winds N. Easterly till midnight.

27th September.—6 A. M. E. N. E. light winds, steering to the Northward, latitude 17° 47′, N. longitude 115° 14′ E. Barometer 29.92. Thermometer 81°. P. M. E. N. E. fine weather, but increasing breeze N. E., at 5 P. M. N. E. by N., at 9 high sea from the N. E.

28th September.—2 A. M. N. N. E. increasing; making all preparations for bad weather. Noon latitude 17° 30′ N., longitude 116°. Barometer at 8 A. M. 29.80, noon 29.70. Thermometer 80°, 1 P. M. hove to, wind about N. N. W. but not marked, blowing excessive hard. Barometer 11 P. M. 29.20.

29th September.—4 A. M. West, 6 A. M. S. W. bore up, and ran 36½ miles to the N. N. W. and N. by W., hove to again at 10. Noon blowing excessively hard from South; latitude account 17° 36′ N. N., longitude by account and D. R. 116° 11′ E.* Barometer 10 A. M. 29.23? Noon 29.36, 5 P. M. wind S. by E., gale moderating, and sea much fallen, at 8 S. S. E. 6 P. M. Barometer 29.65. Bore up at 7 P. M. and ran 6 and 7 knots till midnight, steering N. by W.

30th September.—By midnight fair, at noon fine, and had run from 7 P. M. on the 29th to noon 30th 119 miles N. by W. and N. by W. ½ W. Latitude observed 19° 54′ N. longitude chronometer 116° 00′ E. Barometer 6 A. M. 29.80, noon 29.90.

Abridged Log H. C. S. ELPHINSTONE, *Captain M. Craig, reduced to civil time.*

27th September, 1810.—Noon, latitude 17° 41′ N. longitude 115° 6′, P. M. fine and variable from E. N. E. to N. N. E. till midnight.

28th September.—5 A. M. N. by E. preparing for bad weather. Noon latitude 17° 16′N. longitude chronometer 115° 53′ E. P. M. strong gales N. by E. with hard squalls, 3 P. M. wind N. W. by N. At 5 North, and at 10, N. by W.

29th September.—1 A. M. wind N.N.W. at 3 W.N.W. at 5 S.S.W. at 6 South, at 9 S. by W. at 6 A. M. bore up under fore staysail to look for the Commodore, and ran North five miles. At 8 saw two ships to

* The Log worked back from the 30th gives latitude 17° 46′, longitude 115° 35′, and as she was going free most part of the time, it is far more likely to be correct than a dead reckoning brought forward through the storm

the S. W. lying to, hove to again. At ½ past 9, one bore up across us, gale much increased since daylight. At 10, bore up again, steering North 10½ miles. At 11, fore staysail blew to pieces, sea prodigiously high, rapid, and violent, hove to again, several seas breaking over the ship; set mizen storm stay-sail which blew to pieces, much water between-decks. Noon, water increasing fast, set the weather clue of the fore-sail to wear, but it blew to pieces; latitude by log worked back from 30th 18° 4′, longitude 115° 22′ N. P. M. "an inconceivable increase in the fury of the storm and violence of the waves, ship almost water-logged, apparently settling fast. At half-past one, cut away the mizen-mast, but the ship not wearing, yard arms in the water, and being deadly water logged, cut away the main-mast at ¼ before 2, when she paid off, though she heeled gunwales in; hove the starboard upper guns overboard. All hands at the pumps, steering N. E. At 10 P. M. wind S. by E.

30th September.—At 5 A. M. steered North for an hour, but hauled up again to N. E., moderating gradually. Noon latitude 19° 05′ N., longitude chronometer 116° 26′ E.

No farther logs are given, but the ship had afterwards fine weather like the rest of the fleet.*

Abridged Log of the Hon'ble Company's Ship WOODFORD, *Captain John Martin, reduced to civil time.*

26th September, 1810.—Latitude 17° 30′ N., winds light and variable from N. b E. and N. N. E., at midnight very black to the N. N. E.

27th September.—A great head sea N. E., out all reefs, noon latitude 17° 40′ N. Barometer 29.80. Thermometer 82°. P. M. wind E. by N. and N. E., at 8 P. M. fresh breeze increasing.

28th September.—Increasing from midnight, at noon hard gale, three ships only to the N. b E. in sight. No observation. Barometer 29.20. Thermometer 82°. P. M. wind North and N. b W. very hard gale to midnight. At 2 A. M. wind veered to W., at 4 to S. W., set mizen topsail and foresail, and bore up, steering North, but at 6 it

* The Barometer is not marked in the extract sent, but we learn from Horsburgh, Vol. ii. p. 267, that it fell in this storm from 29·85 to 28·30.

came on to blow with such dreadful violence from S. S. W. that they were taken in, and the ship scudded* under storm fore staysail. At 11 hove to under the trysail. Excessive hurricane of wind, with very thick rain and heavy sea. This ship ran from a little before 5 to 11 A. M. 27½ miles to about the N. W. b W. Noon Barometer 29.20. P. M. wind South, blowing a hurricane, at 9 P. M. South, and moderating at midnight.

29th September.—At 5 A. M. wind South, bore up and ran 29½ miles to the North, and at noon, saw four ships of the fleet from the masthead bearing S. E. At noon latitude 18° 37′ N. longitude chron. 115° 51′ E. Barometer 29.70. Thermometer 80°.

Abridged Log of the H. C. S. CUFFNELLS, *Captain Welbank, reduced to civil time.*

27th September, 1810.—Latitude 17° 46′ long. of the fleet 115° 12′† P. M. the winds and the weather as with other ships E.N.E. and N.E.

28th September.—Making all snug, noon increasing gale, latitude account 17° 12′ N., longitude 116° 0′. E. P. M. wind North, and N.N.W. towards midnight and *moderating.*

29th September.—The sea log says "middle part," (which is here from 8 P. M. 28th to 4 A. M., 29th) the wind *moderated*, and drew gradually round to the N. W., S. W. and S. S. W., when it increased to a hurricane with a high sea from the West, thick spoon-drift; wind marked S. W. at 3 A. M., and S. S. W. at 11. 1 P. M. S. S. W. and at 9 also S. S. W.; at 7 bore up, wind South, and ran 29 miles to the N. b W.; three ships in sight, *Wexford, Alfred*, and *Arniston.* Noon latitude 18° 30′ N., longitude 116° 42′ (properly 116° 12′.)

This fleet generally was so close together that it does not seem necessary to give any tabular view of the winds and weather at noon. I shall therefore only state here the views which induce me to lay down the track in the direction which I consider that of the storm.

We find that before noon on the 28th, these fine ships were sending down top-gallant yards and masts, so that we may fairly say the storm had then commenced. With two ships at 1 P. M. the wind is marked

* This is written *lay to* in the extract, but is evidently an error.

† See note at p. 633.

at North, with three at N. by E. and with one at N.N.E., but as they were dispersed over perhaps eight miles of distance this might occur. We shall not be far wrong if we take the wind to have been N. b E. for this time for the whole fleet, which it will be observed also, was upon the larboard tack standing or rather drifting to the Eastward and Southward. The centre of the storm at this time would then bear about E. b S. of them.

By 12 on the following day the wind which had veered rapidly to the N. W., West, and S. W., shewing that the centre had passed close to the Northward of them, was

With the	*Cuffnells,*	.. .. ..	S. S. W.
„	*Woodford,*	.. .. ..	South,
„	*Elphinstone,* (about)	..	South,
„	*Winchelsea,*	.. .. ..	South,
„	*Alfred,*	.. .. ..	S. S. E.
„	*Wexford,*	.. .. ..	South,
„	*Arniston,*	.. .. ..	South,

but as they were now much dispersed, we may take South to have been the limit of the change within the 24 hours, or 17 points, *i. e.* from N. b E. to S.

The projection of this, with due allowance for the drift, which was round the S. Western and S. Eastern quadrants of the storm circle, and without forgetting that with the ships which were farthest to the Northward the wind was at 8 P. M. S. S. E., will give about a track from the E. b N. to W. b S. for the storm, and I have so marked it.

The distressed state of the *Elphinstone,* which was at one time as near foundering as possible, and the extreme violence of the wind recorded in her log, was evidently owing to her having, by bearing up, ran and drifted more to the North-west than she appears to have done by the mere log. The *Winchelsea* also bore up, as did the *Woodford,* but neither of them had the wind so violent as the *Elphinstone.* This is accounted for by working back their logs, which though always, (and particularly with the *Elphinstone* in this case), an imperfect record, is still the only authentic one. From this it appears that both the *Winchelsea* and *Elphinstone* had an observation, and sights for chronometer on the 30th, and the logs worked back to

noon of the 29th place the *Elphinstone*, then, at least 22 miles to the N. W. of the *Winchelsea;* which was of course 22 miles nearer to the centre of the storm, and it is at this time that her log speaks of the "most inconceivable increase in the fury of the storm." If then, judging from some of my former memoirs, in which by means of two or more shore or ship observations we can in some degree judge of the violence of the wind at given distances from the centre, we can make any estimate of the actual measured distance of the *Winchelsea* from the centre, and call it at most 40 miles? the 22 miles farther to the N. W. of the *Elphinstone's* probable position would then place her exceedingly close to it. We do not know in what ratio to the distances from the centre the violence of the wind augments, but it is evident, here, that the short distance was of such import, that it nearly involved the loss of the ship! I need not say how important this lesson is to the seaman, teaching him not to allow himself to be tempted by a fair wind into bearing up too soon, when it is not of actual necessity that he should do so.

TRACK No. VII.

Tyfoon of H. M. S. Theban and Fleet, *8th and 9th Sept.*, 1812.

Documents from the India House.

8th and 9th September.—His Majesty's Ship *Theban,* with the H.C. Ships *Marquis of Huntly, Cirencester, Elphinstone, Bombay* and *Alnwick Castle,* bound to China, experienced a severe tyfoon in the China seas, in which the *Theban* and *Cirencester* were left with only their foremasts standing. The other ships escaped without damage.*

The H. C. S. *Glatton* was at the same time about three degrees to the Southward of them, and had only a heavy or strong gale. Her log, from which some instructive inferences may be drawn, is subsequently given.

The following are the abridged logs of the fleet:—

* Horsburgh says of this storm in a note Vol. II. p. 267, that Captain Craig of the *Elphinstone*, warned by his Barometer, prepared for a tyfoon, and sustained no injury. This was also the case with others of the ships, as we shall see. The *Cirencester* was fully prepared, but lost her masts from the chain plates giving way.

Abridged Log of H. M. S. THEBAN.

7th Sept.—Noon latitude 16° 6′ N. long. of the fleet 114° 16′ E.

8th September.—4 A. M. wind W. by N.; under storm-sail. At 1 P. M. wind West, strong gales with heavy rain. Split the fore-sail. At 8, heavy gales, W. S. W., at 9, lost the main-mast, at 10h. 15m. the mizen-mast, at 11h. 15m. the fore-top-mast. Lat. at noon 16° 23′ N. long. 116° 51′. E. Midnight the wind S. W. blowing very hard.

9th September.—1 A. M. wind marked W. by S. heavy gales. Noon strong breezes, S. S. W., *Elphinstone* in sight; by midnight fair weather.

The logs of the fleet will be better and more briefly exhibited in the following table, than by abridgements, as they were all near each other:—

Tabular View of the Logs of the Fleet under convoy of H. M. S. THEBAN, *in the Tyfoon of the 8th and 9th September,* 1812, *reduced to civil time.*

Date.	Ship's Name.	Winds and Weather.	Lat. N.	Long. E.	Bar.	Ther.	Remarks.
7th September, 1812.			Noon.				
			° ′	° ′			
	Elphinstone, ..	1 P.M. N.E. At 4 N. midnight N.W.bN. increasing to hard gale. ..	16 14	114 16 E.	..	..	Making every preparation for bad weather. Long. that of the fleet.
	Cirencester, ..	1 P.M. N.N.E. 3 North, 7 N.N.W. increasing from the N.W. with thick weather.	16 7	114 16	..	..	As above.
	Marquis of Huntly,	1 P.M. N.bE. increasing as with the others, ..	16 11	114 16	..	..	As above.
	Alnwick Castle,	1 P.M. N.E.bN. and about N.N.W. at 9 P.M. increasing.	16 7	114 16	..	..	As above.
	Wexford, ..	P.M. N.E., 4 P.M. North, 9 P.M. about N.bW. and increasing.	16 3	114 16	29 50	84	As above, Bar. 6 P.M. 29·45, midnight 29·40.
	Bombay, ..	1 P.M. N.N.E. 4 North, 7 N.bW. increasing; at 9 about N.N.W... ..	16 7	114 16	..	..	Preparing for bad weather.

Date.	Ship's Name.	Winds and Weather.	Lat. N.	Long. E.	Bar.	Ther.	Remarks.
			Noon. ° ′	Noon. ° ′			
8th Sept. 1812.	Elphinstone, ...	3 A.M. W.bS. 5 W.bN., 11 W.N.W. heavy gales; 1 P.M. W.bN., 11 P.M. W.bS., midnight W.S W. blowing excessively hard in gusts, ...	16 20	114 54	..	..	Hove to under storm staysails, and latterly trysail; throughout large sea from the West, constant rain, and dark gloomy weather.
	Cirencester, ...	3 A.M. N.W., 6 W N.W. 1 P.M. W.bN., 5 West...	16 7	.. ..	..	..	From 3 A.M. under storm staysails, and latterly bare poles; 10 P.M. lost main mast, by the chain plates giving way, also mizen mast and fore top mast.
	Marquis of Huntly, ..	3 A.M. W.S.W. no other wind marked. P.M. W.b S., midnight about W. S.W.	acct. 16 11	115 19	..	..	Under bare poles.
	Alnwick Castle, ..	4 A.M. West and W.bN. Excessive hard gale from 8 A.M. 1 P.M. West 6 S.W.bW.	acct. 16 10	114 58	29·32	81	By noon hove to under main and mizen stay-sails, violent squalls and gusts.
	Wexford, ...	4 A.M. W.bN. & N.W. 11 W.N.W., 1 P.M. West, 4 W.bS. heavy gales...	.. ..	.. ..	29·20	80	From 8 P.M. hove to, Bar. 8 A.M. 29·30 noon 29 20 6 P.M. 29 15 midnight 29·15.
	Bombay, ...	1. A.M. about N.W.bN., 3 A.M. about N.W., 5 about W.N W., 9 West. 1 P.M. W.bS. and W.S. W., strong gale as above,	16 21	114 04	..	..	From 9 A.M. hove to as above. See Capt. Hamilton's note on the storm in page 643.

Date.	Ship's Name.	Winds and Weather.	Lat. N.	Long. E.	Bar.	Ther.	Remarks.
9th Sept. 1812.	Elphinstone, ...	1 A.M. S.W.bW. hard gale and heavy gusts till 8 A.M.—P.M. S.W.bW. moderate.	Noon. ° ′ 17 1	Noon. ° ′ 116 10	..	..	To 8 A.M. heavy gale, at 8 A.M. moderating, bore up.—P.M. saw the Theban to the W.N.W.
	Cirencester, ...	7 A.M. W.S.W. strong gales, P.M moderating, 5 P.M. S.W., 10 S.W.bS.	16 30	116 10	..	..	Clearing the wrecks and rigging jury masts. Lying to.
	Marquis of Huntly, ..	A.M. moderating, P.M. S.W.bW.	acct. 16 31	114 58*	..	..	At 8 A.M. bore up.
	Alnwick Castle, ..	7 A.M. W.S.W. bore up, 1 P.M. W.S.W. ..	16 42	115 47	29·40	81	Barometer when lowest 20·19, but time of this not given; moderating at daylight, and bore up at 7½ A.M.
	Wexford, ...	7 A.M. S.W., 1 P.M. S.W by W.	16 36	115 44	29·35	81	Ther. 84°, moderating at daylight as with the others.† Bar. 8 A.M. 29·20, noon 29·35.
	Bombay, ...	Wind not marked, ..	16 38	.. ..	..	..	Bore up at ½ past 10 A.M.

* 113° 58′ in the MSS. evidently an error, as she was in sight of the *Bombay* and *Alnwick Castle*, P.M.
† Perhaps?

The following remarks are from the log of the *Bombay,* Captain Montgomerie Hamilton, they give a very good epitome of the storm :—

"*9th September,* 1812, *Nautical time.*—Throughout hard gales at S. and W. with squalls and rain; towards noon more moderate. From 8 A. M. on the 8th of this month to about 5 on this day, experienced very blowing weather. From having the fresh S. W. monsoon on the 6th, the wind drew round to the Eastward with squalls, at times, drawing round to the Northward on the 8th, when it gradually freshened up with a regular fall of the Barometer, the wind coming round to the West, and blowing most severely from the W. N. W. and W. S. W. breaking up from the W. S. W. to S. W. blowing extremely hard, with furious gusts and hard rain throughout. The peculiar indications of this weather coming on were a gradual fall of the Barometer, which fell one-tenth below 29.00* the weather feeling hot and close, hotter than at an equal height of the Thermometer at this time, which was 81 degrees. When the wind was to the Eastward, it was light with a clear horizon and dusky flying clouds. The wind drawing to the Northward, the horse flies† made their appearance. Had no extraordinary swell previous to its coming on."

We have now to abridge the log of H. C. Ship *Glatton,* which as I have stated, was about three degrees to the Southward of the fleet, but nearly on the same meridian.

Abridged Log of the H. C. S. GLATTON, *Captain Jas. Halliburton, reduced to civil time.*

6th September.—The *Glatton* was in latitude 10° 28′ N. longitude 111° 12′ E.

7th September.—A. M. log for this day is not given, but working back from that of the 8th she was at noon in latitude 12° 00′ N., longitude 112° 15′ E. P. M. winds from N. N. W. variable and squally till midnight.

8th September.—From midnight strong squalls, bent storm stay-sails. 4 A. M. wind S. W., 7, W. by S. Noon blowing fresh, lat. 13° 18′ N., long. 114° 32′. E. Bar. 29.48. Ther. 81°. P. M. strong gales West,

* So in MSS., but probably an error, as 29.15 is the lowest registered depression in the log.

† Horsburgh.

steering North, 5, 6, and 7 knots, heavy confused sea. 11 P. M. hard squalls and sharp lightning.

9th September.—2 P. M. W. S. W. going 5 and 6 knots to the N. N. W. and N. by W. till noon, when in latitude 15° 30′ N., long. 114° 46′ E. Bar. 29.30. Ther. 84½. P. M. wind W. S. W. moderate, but heavy confused sea.

10th September.—Till noon the heavy confused sea continues, latitude 17° 51′ N., longitude 113° 52′ E. Barometer 29.50. Ther. 84.

We have now to consider the probable track of this storm. It is clear from its mode of veering, that it was one passing to the Northward of the fleet, and we may perhaps suppose its centre to have been at one time, from the great depression of the Barometer, not more than 40 or 50 miles distant. Its track is next to be considered.

We have not the *Theban's* log for the 7th, but as towards evening, say 6 P. M. of that day, the Indiamen had all sent down top-gallant yards, and struck the masts, we may fairly take the gale to have began by this time from N. N. W., and we find very clearly from Captain Hamilton's remark in the *Bombay's* log, which I have just quoted, that it was "breaking up" between W. S. W. and S. W., that is about S. W. by W. The drift of the fleet was about E. S. E. or E. by S. Projecting this, it gives about a W. half N. course for the centre of the storm, which I have taken. It could I think be hardly more than W. by N. and certainly was not due West.

The *Glatton* was too far to the South, and too nearly on the same meridian, to afford us any assistance in estimating the track of the storm, though it is clear it was of no great extent, since it barely reached her. Her crossing the "confused sea," which the centre of the tyfoon left behind it is curious; and an exact confirmation of what occurred to the *London Thetis,* in the *Golconda's* storm of September 1840, as will be subsequently noticed.*

The barometrical observations made on the *Wexford,* for which I am indebted to Mr. Packman's notes, are of much interest. It would seem from them, (and they are so fully corroborated by those of the other ships which have noted the state of theirs in their logs,

* See Fourth Memoir on the Law of Storms, Jour. As. Soc. vol. x. p. 905.

that we may accord them full confidence,) that the total depression was as follows:—

	Ther.	Bar.	
6th Sept.—Noon,	82	29.60	Wind westerly squalls & rain.
7th Sept.—Noon,	84	29.50	Easterly, squally, unsettled, latterly N. E.
6 P. M.	83	29.45	N. E. & Northerly.
Midnight,	82	29.40	N. Westerly heavy gusts.
8th Sept.—8 A. M.	82	29.30	Gale N. Westward.
Noon,	80	29.20	
6 P. M.	80	29.15	
Midnight,	79	29.15	
9th Sept.—8 A. M.	79	29.20	
Noon,	80	29.35	
8 P. M.	80	29.60	

From this it appears, that from noon on the 6th, to 6 P. M. on the 7th, when we have taken the gale to begin, the depression was 0.05 only in 30 hours, though it had fallen 0.10 in the 24 hours between noon of the 6th and 7th. We then find it from 6 P. M. of the 7th to 6 P. M. of the 8th, or in 24 hours, falling 0.30. It is useful to notice these variations, because they afford a valuable lesson to those who will take the trouble to reflect on them. The *Glatton's* Barometer also gave her, by a fall of 0.18, full notice of the passage of the storm. I shall refer to these subjects more at length in a separate memoir.

TRACK No. VIII.—*Tyfoon of 28th and 29th October* 1819.

Document from the East India House.

By Capt. Probyn, H. C. S. MINERVA.

The H. C. Ship *Warren Hastings* on October 25th 1819, was in latitude 18° 56′ N., longitude 119° 6′ E., when a fresh gale commenced from N. E.

26th October.—Noon latitude 19° 42′ N., longitude 118° 21′ E., increasing gale from N. and N. E.

27th October.—Lat. 19° 58′ N., long. 118° 2′ E., strong gale N. E.

28*th October.*—Lat. 19° 52′ long. 118° 2′ E., strong gale N. N. E. to N. N. W. with drizzling rain and a high sea.

29*th October.*—Lat. 19° 50′ N. long. 118° 51′ E., severe gale N. W. with rain.

30*th October.*—Lat. 20° 9′ N., long. 118° 59′ E., gale increasing in violent gusts to a tyfoon, and shifting round from N. N. W. to South Westward, and S. E., with thick weather and a high confused sea.

31*st October.*—Lat. 20° 21′ N. long. 118° 29′ E., gale moderating from N. E. The thick weather prevented any observation for five days. The wind shifted during the height of the tyfoon, the duration of which did not exceed twelve hours.

This single document, is the only one I have relative to this storm, still, with the assistance of the ship's positions, as the centre evidently passed over, or close to her, it enables us to ascertain its track on that day at least, the 30th, with tolerable certainty, to have been from the E. by S. to the W. by N. coming in, as it undoubtedly did, from the Pacific Ocean. How much of the N. E. gale of the preceding days was part of the tyfoon, and how much the setting in of the N. E. monsoon, we cannot in the absence of any Barometrical observations pronounce. With the N. E. monsoon, the Barometer would have probably risen, while with the storm it would have sunk. It does not seem to have been of excessive violence.

I have marked its track, as shewn by the shift, to the E. by N., and crossing the ship's position at noon on the 30th.

TRACK No. IX.—Lord Castlereagh's *Tyfoon.*

From the Calcutta Journal of February, 1821.

The following brief though distinct notice of a small tyfoon, (for from its violence and change it certainly was entitled to be called one,) is remarkable and useful, as shewing in how low a latitude these may be encountered in the N. E. monsoon. I have not met with any farther notice of it, and mark its track as an East and West one, from the change stated in the account. The longitude of the ship is not given, but it is not of consequence, for in that latitude owing to the shoals and the coast of Cochin China, ships are mostly

about the meridian of 109° E. We shall subsequently notice other instances of the N. E. monsoon tyfoons about this latitude.

"The *Lord Castlereagh* left Whampoa on the 24th November, 1820, and on the 29th, in about latitude 12° N. about 9 A. M., she encountered a heavy gale of wind, which soon increased to a severe tyfoon from the North. She was kept before the wind till about half-past 9, when she broached to. The mizen-mast was then cut away, and she scudded again. At noon she again broached to, when the crew could do nothing. The wind abated a little about 1 P. M., but in half an hour veered to the Southward, and soon increased to all its former violence; so that the vessel became unmanageable and a mere wreck, with every sail blown from the gaskets, the crew could not keep the deck. At 5, the gale began to abate, and between 11 and 12, the weather became moderate.—*Calcutta Journal, February,* 1821.

TRACK No. X.

Tyfoon of the 19th October, 1821.

Documents from the East India House.

18th and 19th October, 1821.—The H. C. Ships *General Kydd* and *General Harris,* bound to China, and in company with each other, experienced a severe tyfoon in about latitude 18° N., long. 112° 30′ E., or upon the meridian, and a little to the Northward of the Paracels. The following are their logs:—

Abridged Log of the H. C. S. General Kydd, *Captain Alexander Nairne, reduced to civil time.*

15th October.—Noon latitude 19° 28′ N. Hainan Head, bearing N. 11 W. to S. 76 W.

17th October.*—By noon latitude 17° 59′ N. A smart breeze from N. E. P. M. wind N. E. by N. standing eight knots to the E. S. E., increasing to a gale with hard gusts before midnight. Wind about N. N. E.

18th Oct.—A. M. increasing to noon, (wind about N. N. E.) making, all snug for bad weather. No observation. P. M. increasing from NbE.

* Log of the 16th is not given.

ship under storm stay-sails, all of which with several of the other sails were blown away from the yards before midnight. Strong tyfoon with violent gusts, a tremendous sea and incessant rain, sea making a clear breach over the ship. Under bare poles from half-past 7 P. M. and wind veering to about N. E. by midnight.

19*th October.*—A. M. heavy tyfoon, sea breaking over the gunwale, and boats washing away. At noon it still continued in severe gusts and tremendous sea. No observation. Wind about E. S. E. P. M. S. E. by E. At 5, gusts not so frequent and hard. Wind about S. E. by S.

20*th October.*—Moderating fast at 4 A. M. By 9 made sail, wind S. E. by E. Noon latitude 18° 21′ N. longitude 112° 40′ E. Barometer in the height of the tyfoon at 28.65, but only this single notice of it.

Abridged Log of the H. C. S. General Harris, *Captain Welstead, reduced to civil time.*

15*th October.*—Latitude 19° 30′ N. High land of Hainan N. N. W. Taya Islands N. by E. Log of the 16th not given.

17*th October.*—At noon in company with the *General Kydd*, latitude observed 18° N., longitude 112° 30′ E. Bar. 30.00. Ther. 85°. Standing S. E. by S. with a 5 knot breeze from N. E., P. M. to midnight squally. Barometer at 9 P. M. 29.90.

18*th October.*—Increasing wind, about N. N. E. and N. E. by N. Noon hard gale and making all snug. No observation. Bar. 9, A. M. 29.70. P. M. Wind marked North, and at 7 P. M. N. E., hard gale with violent squalls throughout, losing sails, boats, &c.

19*th October.*—The same weather 10 A. M. Wind East. Cut away the main-yard which was adrift. Noon no observation. Bar. 28.75. Ther. 82°. At 2 A. M. wind S. E. by E. 1 P. M. shipping seas so heavily to leeward and over all, that it was necessary to heave the lee quarter deck guns and carriages overboard to make a passage for the sea ; bulkheads of cuddy washed away. 5 P. M. wore under bare poles. Wind about S. E. by E. to midnight.

20*th October.*—7 A. M. moderated from the same quarter or about S. E. The log remarks, " During this tempest we have experienced a

most extraordinary, and providential current in favour to the N. E. Barometer in the height of the tyfoon 28.75." Ther. 82°. Lat. observed 18° 21′ N., longitude by chronometer 112° 43′ E.

If we take this storm to have begun about North, and to have ended at S. E. with the drift as made good by the observations, it will upon projection give a track about from N. 74° E. to S. 74° W. for the centre, which may probably have passed within about 40 or 50 miles of the ships. The singular anomaly of a N. E. current is very remarkable.

TRACK No. XI.

H. C. S. Macqueen's *Tyfoon of* 14*th and* 15*th September,* 1822.

Document from the India House.

Log reduced to civil time.

The H. C. S. *Macqueen* bound to China was on the 12th September, in latitude 17° 35′, longitude not given, and on the 14th September at noon in latitude 20° 25′ N., longitude 114° 50′ E. Squally, thick cloudy weather, and second reefs in the topsails. Wind at 11 A. M. N. W. but variable. P. M. swell from the North. 3 P. M. increasing fast from N. W. and N. W. b W. and preparing for bad weather. At 6, increasing to a tyfoon, and storm stay-sails blown away. Midnight a tyfoon about South.

15*th September.*—Moderating towards day-light, when the ship bore up with the wind at S. E., latitude at noon 20° 53′ N. In addition to the log, there is also a memorandum by Captain Bax, who was second officer on board the *Macqueen,* but he states the wind to have veered by the East to S. E. which would make the centre pass to the South of the vessel, whereas by the log it evidently passed to the Northward of her position, and I have preferred the log as a written record, the memorandum of Capt. Bax being apparently from memory. There is no wind marked in the log except N. W. at 1 P. M., but from the coming up and falling off of the ship, it is clear that the wind veered as I have stated. I have, however, in consequence of this discrepancy, marked the track as doubtful, meaning

thereby, that its *position* is so, though its direction is well enough ascertained, *i. e.* both log and memorandum agree that the storm began at N. W. and ended at S. E. This, with allowance for the ship's drift, will give a track about from S. 57° E. to N. 57° W.

Capt. Bax's memorandum adds, The "above-mentioned tyfoon came on exactly as described by Horsburgh, commencing the strongest to the Northward, and veering round to East and S. E.

"For two days previous, it had been nearly calm, and numerous horse-flies covered the rigging, which Horsburgh mentions as the usual forerunners of such storms. The Barometer fell very low, and gave due notice, and the ship was prepared by its warning, but I have not a memorandum of the fall of the Barometer."

TRACK No. XII.

H. C. S. Castle Huntley's *Tyfoon of 25th to 27th Sept.* 1826.

Document from the India House.

The H. C. S. *Castle Huntley*, bound to China, experienced a severe tyfoon in September, 1826. The following is an abridgment of her log, reduced to civil time :—

24th September.—Noon, latitude 14° 17′ N., longitude 114° 10′ E. p. m. moderate and variable. Winds between N. and N. N. W. with squally weather and lightning to the Eastward towards midnight.

25th September.—a. m. squalls increasing from N. N. E., and at 10 a. m. under close reefs and reefed fore-sail, with a heavy breeze from N. E. At noon down top-gallant-yards. Latitude, indifferent observation, 14° 30′ N., longitude 114° 30′ E. Barometer 29.55. Thermometer 84°. p. m. fresh gale N. E., 5 p. m. hove to under storm stay-sails, heavy puffs N. E. at 7 p. m. Midnight N. E., violent squalls with thick rainy weather.

26th Sept.—At 1 a. m. Wind N. E., 7 a. m. N. E. At noon about E. N. E. No observation. Barometer 29.00 and falling. No appearance of the weather moderating. 1 p. m. wind E. by S. a heavy gale, and by 6 p. m. S. E. by E. About 1 p. m. Barometer began to rise, though the gale was by no means abated till midnight. 11 p. m. wind marked S. E. by E.

27th September.—5 A. M. Wind E. by S., Noon S. E. by E. again. At 6, saw the Triton Sand-bank, bearing about E. S. E., distant 10 miles; 7, made sail. At 10, by the bearings, latitude 15° 50′ N., longitude 111° 12′ N. Noon Bar. 29.53. Ther. 83°. P. M. fresh breeze from S. E. and fine. At 1 30 P. M. Discovery Shoal from N. to E. A northerly current of 47 miles for the last 24 hours.

To this log is appended the following important note: "Mr. Wise, "formerly an officer of the *Castle Huntley*, remarks, that when this "tyfoon commenced, the ship was to the East of the Macclesfield "Shoal, and drifted during it upwards of 300 miles* under bare poles, "having sighted the westernmost of the Paracels before the gale "terminated."

There can be no doubt that this was a storm passing to the South of the ship; and as the gale veered from N. E. to S. E. b E., while the drift of the ship was from noon the 25th to 10 A. M. on the 27th N. 67½° W. 210 miles, this when projected gives the centre of the storm a track of from S. 77° E. to N. 77° W., which is probably not far from the truth. The Barometer falling only to 29.00, though the tyfoon was severe, shews that the distance of 70 miles from the centre which this projection allows when it was nearest to the ship, is not excessive.

The projection will also furnish us with an approximation to the rate of travelling of the centre of this storm. The drift from noon 25th to 10 A. M. on the 27th, is as I have said 210 miles, and the centre, (the wind being N. E.) at the first epoch, bore S. E. from the ship, and at the latter S. W. by S. Assuming that at about noon on the 26th the centre bore due South, (wind being between E. N. E. at 10, and E. by S. at 1 P. M.) we have thus three lines of bearing for it, and taking the distance of it to be as I have before stated, it will be found that it must have travelled about 180 miles, or 7½ miles per hour in each of the 24 hours.

The extraordinary drift is a phenomena of the highest importance to navigation, and it is evidently analogous to those experienced on the South Coast of China, both probably occasioned by the "storm wave."

* NOTE.—So in MSS. The measured drift is 210 miles between Noon 25th and 10 A. M. 27th. Mr. Wise's calculation seems made from an earlier hour on the 25th.

I shall not forget to notice this subject at the conclusion of the present memoir.

1827.

The object of the present memoir being not only to present details of well-ascertained storms, but also to record such imperfect knowledge as may reach us of other tempests in the China Seas, in the hope, that these notices may one day elicit others, I make no apology for inserting two notices from the valuable memoranda sent me by Mr. Packman, through the Honorable the Court of Directors.

H. C. S. Scaleby Castle, *China Sea off Palawan.*

27*th October* 1827.—After having had for the three or four previous days, strong breezes from the N. W. to S. W., with squalls and rain, and continual thick weather, so that we could get no sights for latitude, either by day or night, it came on to blow a fresh gale in the latter part of the 26th, continuing to the 27th, and moderating on the following days with fine weather, when we obtained sights and ascertained our exact position; we were then at anchor amongst the Paraguas, off the Coast of Palawan; we had moderate Westerly winds for the next three or four days, as we stood to the Northward. Lat. about 9° 00′ N., long. 118° 00′ E.

2*nd and* 3*rd November.*—H. C. S. *Scaleby Castle.*—Variable light airs. Latitude observed 13° 56′ N., longitude per Chron. 119° 20′ E.

4*th November.*—Moderate breezes from the N. W. in the first and middle parts, latterly fresh from the Northward with hazy weather. Latitude observed 14° 22′ N., longitude 119° 27′ E. Blowing a fresh gale from the Northward in the first and middle parts, latterly moderating with fine weather throughout, and on the following day moderate Northerly breezes and cloudy weather. Lat. observed 14° 12′, longitude per Chron. 119° 19′.

The foregoing two storms do not furnish us with any fair data from which to deduce a track, but the first *may* have been the Southern half of a storm passing a couple of degrees to the Northward of the ship's position.

in the chart, and the second seems very probably to have been also a storm travelling towards the ship, but from which she escaped by running to the Northward so quickly.

1828.

Extract from the Log of the H. C. S. MARQUIS OF CAMDEN, *towards China, reduced to civil time.*

Document from Captain Wylie.

2*d Oct.* 1828.—At noon in latitude 19° 9′ N., longitude 116° 26′ E., cloudy weather; increasing breeze from the N. E. with squalls of rain at times. Ship standing to the North and N. N. E.. P. M., and to midnight variable light airs, and calms with heavy rain.

3*d October.*—At half past 12, breeze increasing to a gale at N. E., hove to under main stay-sail, hard squalls and heavy rain. No observation. The gale still continuing; 3, wore ship, wind *about* N. E. At midnight wind decreasing.

4*th October.*—A. M. moderating and veering to the Eastward. At noon latitude 17° 17′, longitude 115° 13′.

Again on the 7*th October.*—The *Marquis Camden* was at noon in latitude 19° 7′ N., longitude 115° 43′ E., blowing hard in heavy squalls and rain; increasing P. M. to a gale at N. E., with a head sea reducing her to close reefed top-sails.

8*th October.*—By noon the wind had veered to N. W., heavy rain and high sea continuing, wind being about N. by E. at 1 A. M., and North or N. by W. at 7. It is marked at N. W. at 11. Latitude about 18° 10′, longitude 116° 40′ at noon. P. M. a gale from N. W. ship striking topgallant-masts.

9*th October.*—From midnight gale continuing, but at daylight moderating a little. Noon latitude 18° 47′, longitude 117° 52′. E. P. M. gale from N. W. continuing with a heavy sea throughout.

10*th October.*—Wind gradually veering back to N. E. at noon, when in latitude 19° 21′ N. and latitude 118° 22′ E. and continuing so, with squally unsettled weather, till the 13th, when the land was made.

There are no Barometrical observations with this log, and it is therefore very uncertain if these storms were rotatory ones, or, though so early in the season, the effect of the monsoon's setting in heavily,

which by the weather they had to the Coast of China, I should incline to believe it was. The veering of the wind from N. E. to N. W. at first inclines us to believe, that it may be part of a circular storm, but as it never came farther to the Westward than N. W., I am upon the whole inclined to believe, that the whole was the conflict of the two monsoons, rather than the effect of rotatory storms, and I have not therefore marked even a conjectural track for these. We shall see in 1837, Track No. XXV. in the log of the *Ariel*, another instance of this sort of *vibration* of a heavy monsoon between N. W. and N. E. at its first setting in.

TRACKS No. XIII. AND XIV.

Tyfoon of 8th and 9th August, 1829.

Documents from the India House, and from Colonel Reid's Work.

9th August, 1829.—A strong tyfoon, though of short duration, was experienced at the entrance of Canton river, by which the H. C. Ship *Bridgewater* was driven on Lintin Sand and dismasted. The *Herefordshire* also at anchor, in company with her, fortunately rode out the storm in safety. Three other ships, the *Charles Grant, Lady Melville,* and *Buckinghamshire,* also bound to China, were about on the meridian of Canton, and in latitudes from 16° to 19° N. They also experienced bad weather on the 8th and 9th ; but, as I shall subsequently shew, this was certainly not the same storm, though Col. Reid, to whom an incorrect copy of the *Charles Grant's* log had been given, supposes it might have been so.

Abridged Log of the H. C. S. BRIDGEWATER, *Captain T. Manderson, civil time. From Col. Reid's Work, p.* 277, *of* 2*d edition.*

9th August, 1829.—At anchor with Lintin Peak N. ½ W. Peak of Lantoa S. E. West Point of Tungcoa N. EbE. ½ E. Wind, first part variable from Northward and squally. 2 A. M wind Northerly, and Barometer falling fast. at 8 A. M. Barometer 26.30, and on the decline. At 9, wind marked Easterly blowing hard, and veering to the East; let go a second anchor at 10, wind E. S. E. Violent gusts, parted the small bower, let go the sheet, riding with two cables out upon each anchor. Noon, Barometer 29.17, with very thick weather, tyfoon increasing,

bent the small bower to the spare anchor; preparing to strike yards and top-masts. Having driven into four fathoms water on the edge of Lintin shoal, after consulting the officers, cut away the masts, brought up in three and half fathoms in soft mud. P. M. wind decreasing, midnight moderate.

10th August.—1 A. M. wind marked S. E. with passing squalls and rain.

Abridged Log of the H. C. S. HEREFORDSHIRE, *Captain Hope, civil time.*

From the India House.

Sunday, 9th August, 1829.—At anchor, Lintin Peak N. N. W. the *Bridgewater* in company, first part a fresh breeze from the North, increasing in the middle part to a most severe gale, with tremendous heavy gusts. At 3 P. M. gale abating very fast. At 11 A. M., observed the *Bridgewater* driving at times till 1 P. M. At half past 2, saw her with all her masts gone, sent our boat on board of her, and found she had three and half fathoms water alongside. Throughout the gale cloudy weather, with heavy rain.

Extract of a letter from Mr. E. Ford, then Chief Officer of the HEREFORDSHIRE.

From the India House.

8th August, 1829.—Anchored in the Chinese waters, Lintin bearing N. N. W., weather remarkably close and sultry. In the night, a fresh breeze sprung up from the North, which drew round to East, increasing towards noon, (on the 9th), to a most severe gale, with tremendous heavy gusts, so much so, that the *Bridgewater* was driven on shore. At 3 P. M. gale abating. At 6, moderate and fine weather.

Barque INNORE *in Macao Roads, civil time.*

Sunday, 9th August, 1829.—Had dark squally appearance from the N. E. At 2 A. M. hard squalls. At 4, making preparations for a tyfoon. At 11, being fouled by a Portuguese brig, slipped to run into the harbour, but at noon grounded. P. M. clearing up. Midnight, wind East, with cloudy weather.

Abridged Log of the H. C. S. Lady Melville, *Captain R. Clifford, bound to China, reduced to civil time.*

From the India House.

8th August.—At noon latitude 17° 30′ N., longitude 114° 2′ E. p. m. wind N. W. by W., freshening to a strong gale at midnight, when it was at W. by S.

9th August.—6 a. m. struck top-gallant-masts. At 10 a. m. wind S. S. W. more moderate. Noon latitude account 19° 14′ N., longitude 114° 15′, p. m. S. S. W. fresh breeze. At 5, S. by E.; a heavy swell throughout.

Abridged Log of the H. C. S. Charles Grant, *civil time.*

From Col. Reid.

In the communications from the East India House, I am referred to Col. Reid's work for this log. As remarked p. 654, Col. Reid has been apparently misled by the log of the *Charles Grant* having been sent to him as if kept in civil time, whereas it was really kept, like that of the *Lady Melville,* now before me, in nautical time; for the latitudes, as will be seen agree within 5′ (one ship being probably that distance ahead of the other at noon,) and if the a. m. and p. m. in the first column of the log printed in Col. Reid's works be changed, the winds will then agree, as recorded by the *Lady Melville's* log just given.

8th August, 1829.—Light airs S. by W. to N. W. by W. Noon latitude 17° 35′ N. Barometer 29.55. Thermometer 85°. *Lady Melville* in company, p. m. wind N. W., and at 11 p. m. N. W. by W., freshening to midnight, when the fore and mizen top-sails were handed.

9th August.—1 a. m. wind marked West. 4 a. m. W. by S. Noon no observation. Bar. 29.40. Ther. 83°. Nothing further recorded.

Abridged Log of the H. C. S. Buckinghamshire, *Capt. Glasspoole, bound to China, reduced to civil time.*

From the India House.

8th August, 1829.—Noon latitude by account 16° 4′ N., longitude 113° 37′ E. Wind at 4 a. m. West, 5 and 6 knot breeze. p. m.,

W. N. W.* 5 P. M. W. by N. moderate, but threatening. At 9, wind West, at 10 W. by S., Midnight W. S. W. increasing; ship going 7½ knots to the North.

9th August.—A. M. fresh gale with squalls and rain, and much lightning to the S. E., wind not marked. 6 A. M. under bare poles with hard gusts and heavy rain. 7, set the main-top-sail. 8 A. M. wind S. W. by W. At 10, set fore and mizen-top-sails. 11, wind S. W. by W. At noon S. S. W., latitude observed 18° 25′ N., longitude 114° 4′ E.

I have before observed, that these logs appear to me to relate rather to two storms, and I now proceed to shew why I think they do so, but to afford my readers the same means of judging which I have had, I give here the log of the *Lady Melville*, and a comparative table of the winds and weather experienced by all the five ships.

Log of the H. C. S. LADY MELVILLE, *Capt. R. Clifford, bound to China, nautical time.*
From the Records of the East India Company.

H.	Courses.	K.	F.	Winds, &c	Sunday, 9th August, 1829.
1	N.bE. ½ E.	6	..	N.W.bW.	N.B.—On the 8th Aug. at noon, lat. 17° 30′ N., long. 114° 2′ E.
2	.. .. ..	6			
3	N.bE.	6	..	Fresh breeze down royal yards, in 1st reef topsails.	First part increasing breeze, middle strong gale, more moderate toward latter part.
4	.. .. ..	6			
5	.. .. ..	5	4		
6	.. .. ..	4			
7	N.bE. ½ E.	5	4		
8	.. .. ..	5	4	Cloudy.	6 A.M. the ship pitching heavily, sprung jib boom, split main topsail, furled it and fore topsail.
9	.. .. ..	4			
10	N.bE.	4	4	Freshening, close reefed topsails, down top gallant yards, W.bS. ..	
11	N.bW.	5			
12	.. .. ..	5			
1	.. .. ..	2			
2	.. .. ..	2			
3	.. .. ..	5			
4	.. .. ..	5			
5	.. .. ..	5			
6	.. .. ..	5			
7	North.	3	..	Struck top gallant masts, in flying jib-boom. ..	
8	N.bE.	4			
9	.. .. ..	2			
10	N.bW.	2	..	S. S. W. set foresail & fore & mizen topsails 3 reefs.	
11	.. .. ..	4			
12	.. .. ..	7	..	.. ..	Lat. account 19° 14′ N. Long. account 114° 15′ E. Bar. 29·40. Ther. 83°.
		109			

* MSS.—N. W. which is evidently wrong, the courses being marked N.½E., N. by E., and North to midnight.

H.	Courses.	K.	F.	Winds, &c.	Monday, 16th August, 1829.
1	N.bW.	7	4	S.S.W. Hazy... ..	First and middle parts a fresh breeze, latter more moderate, with squalls, rain, and heavy swell throughout.
2	.. .. ..	7	4		
3	.. .. ..	7			
4	.. .. ..	7			
5	.. .. ..	7	..	S.bE. up top gallant masts and yards, out 3d reefs, cloudy.	
6	.. .. ..	6	4		
7	.. .. ..	6			
8	.. .. ..	6	4		
9	.. .. ..	7			
10	.. .. ..	7	..	Crossed royal yards.	
11	.. .. ..	6	4		
12	.. .. ..	6	4		
1	.. .. ..	7	4		
2	.. .. ..	8	..	Squally and rain	
3	.. .. ..	8			
4	.. .. ..	7	4		
5	.. .. ..	7	..	Out reefs...	Saw the land from the mast head, bearing N.N.W.
6	.. .. ..	6	4		
7	.. .. ..	6	4	E.S.E.	
8	.. .. ..	6	4		
9	.. .. ..	6	4		
10	.. .. ..	3	4	Variable, squally & rain.	
11	.. .. ..	7			
12	.. .. ..	7	4		

Comparative Table of the Winds in the Tyfoons of 8th and 9th Aug. 1829.

Date Civil Time.	Bridgewater and Herefordshire. Lintin.	Lady Melville.	Charles Grant.	Buckinghamshire.
8th Aug. 1829.	4 A.M.	.. .. ..	.. .. ..	West.
	Noon, ..	17·30 N. 114·2 E.	17·35 N...	16° 4′ N. 113° 37′ E.
	1 P.M.	N.W.bW. freshening.	.. .. .. N.W. ..	N.W.
	5	.. .. ..	.. .. ..	W.bN.
	9	.. .. ..	.. .. ..	West.
	10	.. .. ..	.. .. ..	W.bS.
	11	.. .. ..	N.W.bW.	
	Midnight, ..	W.bS. ..	.. .. ..	W.S.W. increasing.
9th Aug. 1829.	1 A.M.	.. .. ..	West, ..	
	2 Northerly. ..	.. .. ..	.. .. ..	
	4	.. .. ..	W bS. ..	
	6	Struck top. gal. masts.	.. ..	Bare poles.
	.. .. ..	.. .. ..	.. .. ..	S.W.bW. making sail again.
	10 E.S E. Tyfoon,	S.S.W. made sail.	.. .. ..	
	11	.. .. ..	.. .. ..	S.W.bS. moderating.
	, ..	19 14 N. 114·15 E.	.. .. ..	S.S.W. 18·25 N. 114·4 E.
	1	S.S.W. ..	.. .. ..	
	2 A.M. moderating	.. .. ..	.. .. ..	
	5	S.bE. ..	.. .. ..	
10th Aug.	1 A.M. S.E. ..			

First, we will take the Lintin records. From these it is clear, that the storm there may be called one lasting about 6 hours only, *i. e.* from 9 in the morning to 3 in the afternoon of the 9th, and during this time, as remarked by Col. Reid, being from N. E. to East, E. S. E., and S. E. We may thus take it to be at noon on the 9th at its full fury at E. S. E. when the centre must have borne about S. S. W. from the *Bridgewater* and *Herefordshire,* and by 3 P. M. it was at S. E., when the centre was of course bearing S. W. from them, and they were then nearly out of its influence; for it is stated, that the boat of the *Herefordshire* was sent on board of the *Bridgewater* at ½ past 2 P. M. Now the bad weather from the N. W., West, and S. W., which was experienced by the other three ships, *i. e. Charles Grant, Lady Melville,* and *Buckinghamshire,* began with those ships before midnight, between the 8th and 9th; and at 1 A. M. on the 9th, when it should be noted that the wind was at least West, and to the Southward of West with some of them. The centre then at midnight, between 8th and 9th, should have borne North from them, and as the wind was about S. S. W. by 10 A. M., the centre bore W. N. W. from them at that time, and they were all not far from the meridian of Lintin. The *Lady Melville* indeed was making sail again at this time. Yet it was at 9 A. M. that the storm was *commencing* with the *Bridgewater,* say from the E. by S., which would give the centre bearing S. by W. from her, and from its violence and fall of the Barometer, much nearer to her than to the ships at sea; and at 10, when, as we have noted, they were making sail with a S. S. W. wind, it was blowing a tyfoon at E. S. E. at Lintin. No projection will reconcile this, and no allowances from the anomalies produced by the land, will account for the discrepancies in time, I think. We know that the ships at sea had nothing to alter the fair course of the storm, but as will be seen by the chart, the high land on the Eastern shore of the river, and that of the large island of Lantao, may have greatly influenced the direction of the wind.

Again, if the storm experienced by the ships at sea had occurred *later* than that at the anchorage, we might suppose it to have been, as in the instances of the *Ariel* and *Marquis-Camden,* a disturbance or *vibration* of the usual monsoon, (this being the height of it,) occasioned by the storm to the Northward; but it does not seem so probable that

this disturbance preceded the tyfoon, not at least by so great an interval of time as from ten to twelve hours.*

Upon the whole, then, I should be inclined to suppose, that there were two storms, of which the centre of that of the ships at sea, bore North from the *Charles Grant* and *Lady Melville*, at 1 A. M. on the 9th, and as it was not severe, and not felt at Lintin, it was probably of small extent. I have then marked a conjectural track for it in No. XIV., from S. 78° E. to the N. 78° W., and those who study the subject, will agree with, or dissent from my views as they please. I have laid down the Lintin storm as coming from East, the height of it appearing to have been about noon, when the centre would have borne S. S. W. from the ships; but this is almost conjectural, for amongst high rocky islands like those at the entrance of Canton river, the wind may have been modified in many ways. The storm of the ships at sea I have laid down as passing from the E. S. E. to the W. N. W., though from the absence of any registry of the Barometer, except at noon, we cannot say when the storm fairly began or ended; but with due allowance for the run of the ships in the interim, I think it may be taken as far to the Southward as this.

The Waterloo's *Storm.*

Document from the East India House—Mr. Packman.

26th August, 1829.—The H. C. S. *Waterloo* appears also to have been within the range of one of those E. S. Easterly storms, about a degree farther to the Southward, than the ships in the former article. The following is the memorandum sent me, but I have not marked a conjectural track from it, as no other document has been obtained relative to this storm, which indeed we could scarcely notice as one, but for the remarkable fall of the Barometer.

H. C. S. Waterloo, *in the China Sea.*

26th August, 1829.—A brisk monsoon in the first and middle parts with squalls and rain, in the latter variable from the N. W., and

* Even supposing the storm to have come from the N. E. still it cannot be reconciled, as to distances from the centre and intensity, with the times, so that all things considered, two separate storms is the most probable supposition.

cloudy weather. Lat. observation 14° 15′ N., long. per Chron. 113° 29′ E. Thermometer 83°. Barometer 29.75.

27*th August.*—Variable wind, but mostly from the N. W. with squally weather and rain throughout. Lat. 15° 21′, long. 114° 01′ E. Thermometer 81½°. Barometer 29.64.

28*th August.*—Variable winds from the North and N.E. with squally weather and heavy rain and lightning from the Eastward in the middle part. Latitude observation 15° 36′ N., longitude per Chron. 114° 50′ E. Thermometer 83°. Barometer 29.50.

29*th August.*—Variable N. W. winds in the first part, veering round to the S. W. and South in the middle and latter, and increasing to a fresh gale with frequent squalls and rain; following days strong and pleasant breezes from the S. Eastward till our arrival at China. Latitude observation 16° 29′ N., longitude per Chron. 115° 06 E. Thermometer 82°. Barometer 29.25.

TRACK No. XV.

Tyfoons of September, 1831.

Documents from Mr. Redfield and the India House.

The year 1831 seems to have been one in which several tyfoons were experienced in the China seas. We have records, though imperfect, of one in September, and of two in the month of October. The following is Mr. Redfield's abridgment from the Canton papers of the notices then published. I have but one memorandum of this storm from the India House, with, however, a very useful note appended to it by Captain J. K. Forbes, of the H. C. S. *Thames.*

Canton Tyfoon of September 23*d,* 1831.

The American ship *Galen,* from the Sandwich Islands, bound to Canton, encountered bad weather off the Bashee Island on the 21st of September, and on the 23d, near the Lema Islands, lost her mizen mast, fore and main-top-masts, &c.

The British barque *Agnes* from Singapore, also lost her fore-mast on the 23d, and was obliged to cut away the remaining masts. She

was at anchor on the 27th, about nine miles Southward of the Grand Ladrone.

H. C. Ship *Hertfordshire* and Danish ship *Norden*, arrived on the 25th [from the Southward] and experienced no bad weather; the latter reports that on the 24th, a very violent swell was running down from the North-eastward, but the barometer indicated no change, and neither of these vessels were aware of the tempest till their arrival at Macao.

At *Canton* early in the morning of the 23d September, commenced a *hard northerly gale,* which continued without intermission for twenty-four hours. The tide rose to a great height, and much damage was sustained; an official return to the authorities at Canton states, that after it was past, *one thousand four hundred and five* dead bodies were picked up along the coast. The gale was far more severely felt at *Macao* and Kumsing-moon, where it is described as having been truly dreadful.—*Canton Papers.*

We may fairly deduce this to have been a storm of small extent, running down the South Coast of China, about parallel to our Track No. I, which course I have therefore assigned it as a conjectural one, marking it No. XV.

At Whampoa, on the 23*d September,* 1831.—A severe tyfoon was experienced in China, in which several vessels were lost, and great mischief done on shore. At Whampoa, where it was severely felt, the wind, says Captain Forbes, H. C. S. *Thames,* drew round from N. to E. and S. E., but was not of such violence as to be called a hurricane there.

Captain Forbes adds here a valuable note as follows:—

NOTE.—I would here beg leave to mention a circumstance, which may be useful in a practical point of view on such occasions. I left the H. C. S. *Thames,* (which I then commanded,) at Whampoa, on Sunday evening the 18th September 1831, to proceed to Macao in the ship's launch, arriving there next day. Before leaving the ship, I happened to look into *Horsburgh's Directory,* page 10, of the "Introduction and general remarks upon winds, &c. article 'Change of the Moon'," and said to be written by an *ingenious Frenchman.* By the rate there laid down as to the chances of hurricanes, I found that there was a great chance of one at the time it actually occurred at Macao, (on the 23d September,) so I ordered two large anchors and cables to be put into the launch, instead of those in common use. By this, I unquestionably saved my boat, and probably her crew, besides another ship's launch which broke adrift, and was saved by holding on by the *Thames'*."

Storm of 5th and 6th October, 1831.
Notes from the East India House.

5th October.*—H. C. Ship *Farquharson,* Captain Campbell, lying at Whampoa, had a strong gale from the *Westward with severe gusts. Weather too severe for a craft to lie alongside.

6th October, 1831.—H. C. S. *Lowther Castle,* at anchor in Whampoa reach. A severe gale commencing at North, veering round to the East, and then moderating, with incessant hard rain throughout. Barometer fell to 29.17.

TRACKS No. XVI, XVII, AND XVIII.

MANILLA, PANAMA'S *and* FORT WILLIAM'S *Tyfoon of* 23*d,* 24*th, and* 25*th October,* 1831.

Documents from Col. Reid, Capt. Biden, and the Voyage of La Place.

Between sun-set of the 23d, and sun-rise of the 24th October, 1831, a tremendous tyfoon was experienced at Manilla, in which almost all the ships at Cavite, and those lying at the bar, before Manilla, were driven on shore. The American ship *Panama,* and the English ship *Fort William,* also experienced severe storms in the China seas, about the same time. I have first given their different logs, reduced to civil time where necessary, and then a table from which I should deduce, that the Manilla storm, and that of the *Panama,* were undoubtedly one storm, but that of the *Fort William* a different one.

Log of H. M. Frigate CROCODILE, *Captain R. Bancroft, in Manilla Bay. Abridged from Col. Reid's Work, p.* 284, 2*d edition.*
Civil time.

23*d October,* 1831.—Sun-set, increasing breeze and cloudy, veering more Northward from the N. E., at which quarter it had previously been. At 7, veered to 75 fathoms. At 8: 30, down top-gallant-masts, and let go the best bower. At midnight very severe hurricane, with heavy rain and high sea, bent the sheet-cable over all, not being able to get it out of the hause hole.

* This date and the wind at West, are so in the MSS. before me, but both are contradicted by the next extract, a memorandum from the *Lowther Castle's* log, in which the wind, at all events, is probably right.

24th October.—A. M. wind marked N. by W., tyfoon very heavy, with incessant rain and high sea. At 1h. 40m. its extreme rage abated, and shifted to the N. E., the sea became less violent, and the ship rode more easily, but very heavy squalls. No Barometrical observations are given.

Tyfoon of 27th October, 1831,* *at Manilla.*

Abridged from the Notes to the Voyage of La Favorite, *Capt. La Place, Vol. I. p.* 552.

27th October, 1831.—One of these hurricanes ravaged the Colony in a frightful manner. It began at midnight, and lasted four hours. The wind began at N. N. W., and ended at E. N. E. When at North the tyfoon blew with a fury, which no inhabitant had ever seen equalled. The air "seemed on fire." All the vessels at anchor before Manilla and at Cavite went on shore, and were mostly lost. The English Frigate *Crocodile* only, with excellent chain cables, and in about the same anchorage as the *Favorite,* held on, and sustained but trifling damages. The destruction on shore was frightful.

At the Laguna, (thirty miles East of Manilla,) the hurricane was still more severe, though sheltered by high mountains to the North.

M. La Place remarks also, and this is a fact well known at Manilla, the evident relation which the volcanoes have with the hurricanes. Scarcely one occurs in which some volcanic phenomena are not observed, and these are sometimes very violent.

Log of the Ship Fort William, *reduced to Civil time.*

From Captain Biden.

The ship *Fort William,* Captain Neish, bound from China to Manilla, arrived at Singapore on the 12th instant, under jury masts, having been totally dismasted in the passage, probably by the Manilla tyfoon. We have been favoured with the following abstract of the log of that ship, which details the particulars:—

* There is a difference of dates here, but there is no doubt the storms are the same.

Abstract from the Log of the Ship FORT WILLIAM.

"*Sunday*, 23*d October*, 1831.—Our Canton Pilot left the ship, when we hauled to the Eastward, being bound to Manilla."

Monday, 24*th Oct.*—At 8 A. M. passed between the Asses' Ears and the Lema. Strong breezes and cloudy weather from the N. N. E., double-reefed the top-sails and reefed the main-sail. At noon, strong breezes and increasing sea. No land in sight.

P. M. Blowing strong, and sea still increasing; sent down the top-gallant-yards and masts, wind N. E.; steering E. S. E. At 11 P. M. hard squalls and high sea; clued up the top-sails to close reef them. Midnight, weather getting worse, furled the top-sails, and struck top-gallant-masts.

25*th October.*—At 4 A. M., a sea struck, and carried away the starboard quarter cutter. Daylight blowing a perfect hurricane; furled the main-sail. Noon, hard gales and thick drizzling rain. No observation.

P. M. Blowing a dreadful gale, with violent squalls; the sea still increasing. At 8 P. M. the main-mast went over the starboard side, about 14 feet above the deck, and the mizen-mast immediately followed, falling nearly right aft on the poop, the top just clearing the stern, carrying away with it the larboard quarter cutter, stern boats, davit, &c. &c.; cut away all the wreck with every possible despatch, and soon got clear of it. During the night the gale still continued, and the ship labouring excessively, expected the fore-mast to go every moment.

26*th October.*—At 4 : 30 A. M., the fore-top-mast went, and at 8, perceived the fore-mast badly sprung under the fore-castle. Several of the chain-plates and shrouds gave way, the fore-mast immediately went over the larboard bow, sprung the cat-head, and carried away the head rails, bumkin, &c. &c., and struck the ship a violent blow under the water, which shook her, as if she had struck a rock. Cut away every thing, and got clear of all the wreck without, (we hope), seriously injuring the hull, and she made no water, and now being obliged to choke the rudder amidships, for which we had been under very great apprehension during the whole gale. Noon, gale abating, and sea still very high. No observation. Ship labouring so excessively, that we dare not cast loose the booms to prepare jury-masts.

27*th October.*—Fine weather; latitude observation 18° 25′ N., longitude 114° 31′ E.

28*th and* 29*th Oct.*—Ship again under command of her helm, and found that we could just weather the Paracels and Bombay Shoal, with a steady Easterly wind; resolved to make the best of our way to Singapore.

November 2*d.*—Passed in sight of Pulo Sapata.

Saturday, 12*th Nov.*—Arrived safe at Singapore.

Storm raged in lat. from 21° to 18° N., and from long. 114° to 116° E.

During the whole of the tyfoon, the Marine Barometer never fell below 29.60."

The following is the account of the *Panama's* part of the storm, as given by Mr. Redfield:—

"*Extract from the private Journal of Wm. F. Griswold, Esq. Master of the ship* PANAMA, *on a voyage to Canton, October,* 1831.

October 23*d, (Nautical time,) lat.* 9° 17′ *N., lon.* 117° 16′ *E.,* wind came out at southward and continued until 10 p. m., then died away and commenced from the Northward with a heavy head sea. Forenoon, breeze from N. W. and clear weather. *Latitude* 9° 45′ *N., longitude* 117° 25′ *E.*

October 24*th.*—Pleasant breezes from N. W., and hazy steady weather. A sea rolling from the Northward. I suppose there has been a gale in the China sea, which has not yet reached us. Evening, wind rapidly increasing and Barometer falling from 29.75 to 29.40. Midnight reefed top-sails.—9 a. m. double reefed do.—barometer 29.20. Ends with tremendous gale from the westward and heavy sea—barometer 29.10. *Lat.* 11° 15′ *N., long.* 118° 20′ *E.*

October 25*th.*—Heavy gale W. S. W.—barometer 29.05 Gale hauling to the southward. Evening more moderate. Made a little sail. Wind at 7 p. m. from south-westward; 11 p. m. from southward. In the morning at 5 o'clock the wind came out at S. E. (barometer at 29.10) and blew a perfect hurricane. Hove to under mizen stay-sail; barometer at 1 p. m. 29.05, 4 *p. m.* 29.00, 7 *a. m.* 29.10, 8 *a. m.* 29.20. I believe this fall of the Barometer to be, in this latitude, very remarkable.

This gale was on the 24th and 25th October, civil time, and from its peculiar features and double fall of the barometer, there appears something like the falling in of two hurricanes on the same track. It was, doubtless, in whole or in part, the same hurricane that visited Manilla on the night of the 23d of October, and which is noticed by Col. Reid. The irregularities of the storm *may* have been caused by its passage over the Philippine Islands, the Panama being then off the

Strait of Mindoro, and about 210 miles from Manilla. I have deemed it not improbable, that this storm was the same that visited the Bay of Bengal on the 31st of the same month, and was so destructive at Balasore, and on the neighbouring coast. The course from the Panama's position to Balasore is about N. 73° W., and the distance, say 1920 miles, which would give a rate of progression of 11½ nautical miles per hour: which coincides with other storms which have formerly been examined. It is important to ascertain if this storm crossed the Burman empire, immediately previous to its appearance in the Bay of Bengal."

Comparative Table of the Winds and Weather in the Manilla Tyfoon of 23rd October, 1831.

Date.	H. M. Fr. Crocodile & Fr. Frigate Favorite, Manilla.	Ship Panama.	Ship Fort William.
23rd Oct. 1831.	By midnight a Tyfoon from the North, veering from N.bW. and N.N.W. to N.E. ..	Noon 9·17 N. 117·16 E. five PM. pleasant breeze N. W. & heavy Northerly swell. Evening increasing, Barometer 29·40 from 29·70.	Left the land, strong breezes N.N.E. and cloudy weather.
24th Oct. 1831.	A.M. N.bW. ending at N.E.	9 A.M. Bar. 29·20. Noon tremendous gale from West. Bar. 29·10. Lat. 11·51 N. Long. 118·20 E. P.M. W.S. wind. Bar. 29·05. 7 P.M S. Westward 11 P.M. &c.	Noon no land in sight. P.M. blowing strong from N.E. Midnight gale N. E.
25th Oct. 1831.	.. .. ..	5 A.M. wind S.E. Bar. 29·10. Hurricane 1 P.M. Bar. 29·05, 4 P.M. 29·00, 7 A.M. 29·10. 8 A.M. 29·20.*	Daylight a hurricane. P.M. dismasted. Noon 26th abating. 27th, 18.25 N. 114·31 E.

If we carefully consider the foregoing Table, we shall I think agree with Mr. Redfield in thinking, that the Manilla storm and the first of those of the *Panama* were undoubtedly the same, and that it was travelling up from the E. S. E. through the Straits of Mindoro upon about a W. N. W. course. The *Panama's* second storm, which it will be noted was from the S. E., may have been the N. E. quadrant of another storm crossing Palawan, or it may have been an irregularity caused by the junction of the *Fort William's* and the Manilla storm.

* A.M. in Mr. Redfield's pamphlet, P.M. is I suppose meant.

For, as to the *Fort William's* storm, she may be said to have been driven in it on about a S. by E. course, from latitude 25° to latitude 19°. and to have been dismasted about latitude 20°, with the wind at N. E., while the *Panama,* which vessel could not have been in more than 13° 30′, or at most 14° N. had her second storm at S. E., being then at least seven degrees to the S. E. by S. of the *Fort William.* If the storms were the same, the *Panama* should have had the wind S. Westerly, for a S. Easterly wind would require her to have been nearly on the same parallel as the *Fort William.* If the storm had been one also travelling up from the S. E. by S., or S. S. E. *towards* the *Fort William,* it might, it is true, have been, as it was, a tremendous gale at N. E., but at its close it would have veered or shifted to N. W. or S. W., according as the centre passed to the East or West of her position. Nothing of this sort occurred, and it is therefore clear, that the *Fort William's* was a separate storm at N. E. and veering to the Eastward, sufficiently to enable the ship to bear up for Singapore when disabled: whether it was a circular storm, or only the monsoon setting in late with a heavy gale, we cannot, in the absence of the Barometrical observations, decide.

We have unfortunately no records from any ship which might have been at this time in the intervening space between the *Panama* and *Fort William,* or say about latitude 17°, and not far from the meridian of the Macclesfield Shoal. If we had, I think it not improbable, we might have found that the coalition of the two storms might produce a third with a curved track, like our Nos. III. and XXIII.

It is at all events some corroboration of them to find, that the forces which *might* produce such curved tracks have occurred.

I have, then, with these views, assigned an E. S. E. to W. N. W. track, No. XVI., for the Manilla and *Panama's* first storm, a conjectural one No. XVII. from the S. E. to the N. W. for the *Panama's* second storm, and one No. XVIII., (also conjectural, because it *may* have been the monsoon, and our data are imperfect), for the *Fort William's* storm.

TRACK No. XIX.—Tyfoons of 1832.

Documents from Mr. Redfield, Captain Biden, &c.

There appears to have been also during this year two severe tyfoons in the China seas in this year, the one in August, and the other in

October. The following is from the Chinese Repository of August, 1832:—

Tyfoon, 3d August, 1832.

2d.—Evening, wind from Northward. Thermometer 92° and Barometer beginning to fall from 29.60 or 70, but not much wind during the night.

At daylight of the 3d, wind fresh. Barometer fell till it reached 28.10, (with some 27.90). In 1809, (*True Briton's* storm,) it fell to 28.30 only. This storm was far more severe, and was much longer from the North. A Dutch vessel sunk between Lintin and Macao. The *Spartan* driven to sea, saved about 40 of her crew. The tyfoon appears to have extended fully 200 miles from N. to S.

Mr. Redfield has collected the following notices of this storm :—

Canton Tyfoon of August 3d, 1832.

At *Macao* the wind set in from the *north*, and reached its greatest height about 1 p. m.; continuing with the same violence till 5 p. m., when it *veered suddenly to the southward*, but with diminished strength. When the fury of the gale was exhausted, the quicksilver rose at the rate of three-tenths per half hour. *Barometer, August 2d, 8 a. m.* 29 68;—*8 p. m.* 29.34;—*Aug. 3d, 8 a. m.* 29.34;—*5 p. m.* 27.88. Other land barometers differently adjusted, fell to 27.96 and 28.05.

At *Cap-shuy-moon* the gale began at N. and N. W., between which points it blew with tremendous violence; shifting, towards the conclusion to S. E., whence it blew more moderately. The *Barometer*, in the early part, *fell to* 28.20.

The American ship *Don Quixote* left on the day before the tyfoon; and returned on the 5th with loss of mainmast.

Since the tyfoon, the British brig *John Biggar*, from Manilla, has come in dismasted. The Spanish brig *Veloz*, also from Manilla, has arrived with loss of mainmast.

A letter from the commander of the Dutch ship *Fair Armenian*, which foundered about thirty miles westward of the Grand Ladrone, says:—" On the evening of the 2d instant, we made the Grand Ladrone, and on the morning of the 3d, it came on a tyfoon blowing off the land; this about noon increased to a tremendous height and dismasted us; unshipped and broke our rudder, and carried away a great part of the bulwarks. The gale was at its height about 4 or 5 p. m., and after dark gradually moderated."

The *Edmonston, Caledonia, Esperança* and *Italy* have come in without damage. The *Caledonia* on the 3d, when in *latitude* 17° *N.*, *longitude* 113° 50′ *E.*, experienced a *strong gale from W. veering to S. W. and S.*, with a heavy and confused sea. *The barometer fell to* 28.50. The *Edmonston*, on the same day, when within seventy miles off the land, felt the *same weather*, which brought her under bare poles for four hours.

At the *Bocca Tigris*, the weight of the tyfoon, which in *Canton and Whampoa ranged from N. to N. E.*, was felt about 4 or 5 p. m.; the *barometer standing at* 29.10. About 6 p. m. the quicksilver rose, and the gale began to abate.

At *Canton, August, 3d.* Blowing hard at N. and N. E., with violent gusts; *barometer* 29.15; and for the most part rain. *August 4th.* First part blowing hard, *wind S. E. barometer* 29.70;—middle and latter parts strong breezes and fine weather.—*Canton papers of August*, 1832.

Extract from the Journal of an American Shipmaster, bound to Canton. "August 2d, 1832, (nautical time,) *latitude* 18° 34′ *N.*, *longitude* 114° E.; *barometer* 29.56. First part light and baffling winds *from E. to N. E. and N.* and hazy:—middle part the same:—At 4 *a. m. calm, barometer* 29.59:—At 4-30 a. m. a breeze sprung up from W. N. W.;—made all sail by the wind. Latter part and end, strong W. N. W. wind and rough head sea. Took in the royals, flying-jib, and fore and mizen-top-gallant sails. *Bar. at noon* 29.40. The weather, however, looks very fine, and the breeze is steady at W. N. W. *latitude* 19° 54′ *N.*, *longitude* 130° 50′ *E.*

August 3d commences with a strong steady breeze at W. N. W. and hazy weather, barometer falling fast. At 2 p. m. down to 28.98, but not the least unfavorable *appearance* in the clouds, sea, or weather. [The ship was at this time running into the path of the gale, from its southern side.] I must acknowledge that the rapid fall of the mercury, within the last ten hours, has alarmed me not a little, and we are now preparing for the worst of weather.—At 4 *p. m. barometer* 29.25 and the wind freshening; single reefed topsails. The old tars who have seen sail carried on this ship through thick and thin in the stormy regions of the southern ocean, now look at each other with amazement at such preparation for apparently nothing. Towards evening the weather begins to look unfavorable; the sun went down in a body of clouds, deeply tinged with red; not the rich and variegated tints that give rise to pleasurable sensations to all who look upon them, but the fierce, glaring, angry red that creates distress in the bosom, particularly of a mariner. After sunset the moon (at the 2d quarter) could be seen at intervals through the clouds that are driving *from the N. E.* at the rate of twenty knots, and the lightning *shooting up* from every point of the compass. *At* 8 *p. m. barometer* 29.15. Took in all sail, but the close reefed fore and main top-sails and fore-top-mast staysail; the wind still steady at W. N. W. Sounded in 45 fathoms, the *Grand Ladrone bearing N. N. W.* 38 *miles.*

At 10 *p. m. the wind suddenly shifted to W. N. W.* [N. N. W.?] *in a squall.*—Heavy rain and distant thunder until 5 a. m.:—*Had continued shifts of wind all round the compass.*—*At* 7 *a. m.* a steady gale very severe, from about N. W. and constant rain:—hove to under the reefed main-top-sail:—*At* 8 *a. m. barometer* 29. ! !—Latter part and end, the real genuine, unadulterated Chinese *Tyfoon;* a steady roar and constant rain; took in the main-top-sail.

August 4*th.* (P. M. of 3d.) The first quarter of this day extremely severe gale and thick weather.—*At* 2.30 *p. m. barometer* 28.88; shortly after which it began to rise:—*at* 6 *p. m.* 29.05;—*at* 8 *p. m.* 29.08, and moderating.—During the night, *hard gale from N. W. to W. S. W.* and torrents of rain.—*At* 4 *a. m. wind S. W to S. S. W.* and hazy:—made sail and by 5 a. m. had royals and studding sails set. During the day passed a number of wrecks, and when we arrived, (5th,) found that the hurricane had been very severe, and caused immense destruction."—*New York Journal of Commerce.*

I have given these logs as they stand in Mr. Redfield's pamphlet, but I should be inclined to think, that the *Caledonia's* storm might be nothing more than a monsoon gale, of which we have so many examples, and which like those of the Bay of Bengal, may be more liable to happen when a circular storm is travelling across in the leeward part of the Bay or sea.

The "American ship master" whose name is not given, seems to me, when he experienced his shift of wind at 10 P. M. of the 3d, to have been just on the limit between the Macao tyfoon and the monsoon gale of the *Caledonia,* for it was certainly not the centre, which at 5 P. M. was at Macao, and if it had travelled to the Southward to reach the American ship, would have left that place with a gale from the N. E., or S. E., or East, whereas by taking the Macao tyfoon to have extended to about this latitude only, which gives it a semi-diameter of 75, and consequently a diameter of 150 miles, and the *Caledonia's* storm as a moonson gale, the steady *breeze* at W. N. W. &c., which the American ship had in latitude 20°, (or half way between the *Caledonia* and Macao,) until he ran into the Southward, half of the storm is clearly accounted for.

On these grounds, then, I have marked for this tyfoon, an East and West track, No. XIX. though it should be borne in mind, that it might really have been a point, or even more to the North or South of East and West, but we have no data, from which to say positively that it was so.

TRACK No. XX.

The Moffatt's *Tyfoon.*

The October tyfoon was experienced by the H. C. Chartered ship *Moffatt,* Captain Cromarty. The following is from a Singapore paper, and sent me by Captain Biden. I have here and there abridged those parts which are not essential to our research, and reduced the whole to civil time :—

Singapore, Thursday, 8th November, 1832.

The Company's Chartered ship *Moffatt,* Captain Cromarty, bound for China, put in here the day before yesterday, having lost her main and mizen-masts, and fore-top-mast, and having suffered many other injuries during a violent and protracted hurricane, which she encountered in the China seas within a very few degrees of her destination.

We have been favoured by the Captain with the perusal of the log-book kept during the period of the tempest, from which we are at liberty to give the following details of the various disasters which the ship sustained. The hurricane lasted five days:—

Monday, 22d October. Course E. by S.

"Wind N. E. by N. hard gales, vessel going under close-reefed top-sails. Furled fore and mizen-top-sails and courses, set the storm mizen and main-try-sails. At 11 P. M., heavy hurricane; split the main-try-sail, and furled the main-top-sail. At 1 A. M., increasing hurricane, with much sea, the ship labouring very much, carried away the main-top-mast. At 2, a heavy sea struck the ship, and carried away the starboard quarter boat; the wreck of the main-top-mast in swinging about stove the cutter, and injured the long boat severely. At 5, a dreadful hurricane; the mizen-mast went by the board. At 9, the main-stay gave way, replaced it with much danger and difficulty. At 11, the hurricane continued, the ship labouring very much, and the sea making a continual break over her. P.M., wind veering from N. to East, hurricane still continuing, making every effort to get the wreck of the main-top-mast on deck; the reefed mainsail got adrift, and blew to pieces. 4 P. M., ship labouring very much. The sea washing over the ship's deck incessantly. At 8, ship

lurching very heavily, the main-mast went by the board. When the main-mast fell, one of the top-sail sheets got entangled with the waste anchor, and brought it right on deck.

23*d October*.—At 1 A.M., hurricane abating a little. At 5, hurricane still abating, but a dreadful sea, and the ship rolling very heavily. Carried away the fore-top-mast. At 11 and 12, weather moderating, set the foresail to endeavour to steady the ship, people employed in clearing the wreck. Lat. per observation 17° 9′ N., long. 113° 30′ E. P.M., wind from N.E. to E., employed clearing the wreck. At 7 P.M., hard gales with heavy rain, ship rolling very much, and shipping a great deal of water over all. One pump constantly going. At 10, severe hurricane, which continued until next morning.

24*th October*.—From the continued heavy rolling of the ship, almost every thing, both in between decks and hold got adrift, and it was almost impossible to stand on the deck. P. M., wind from N. E. to N. Hurricane continued throughout the day; the ship labouring very much, and requiring to be pumped every hour.

25*th October*.—Hurricane continued, pumping every hour; shipping great quantities of water over all. Noon latitude 14° 20′ N., longitude 109° 53′ E. At 5 P. M., finding the ship to have driven a long way to the Southward and Westward from the commencement of the hurricane, and also considering the disabled state of the ship, and impracticability in its present state of effecting a passage against a strong N. E. monsoon, bore up for Singapore." No mention is made of the barometer in this ship's log.

The Dutch ship *Esperançe* of Batavia, from China, is the only arrival since the gale."

As the *Moffatt* was bound to China, she of course stood to the N. W. as long as she could on the 22d with the N. E. by N. gale, and was then driven back when lying to and disabled, so as to be at noon on 23d in latitude 17° 9′ N., when the storm again increased and drove her to latitude 14° 20′, just clearing the Paracels; but from the winds veering *from N. to East* on the 23d, and then moderating before another storm set in, we should at first be inclined to take this for two storms, but it seems more probable, that it was one from the N. E. of very slow progress; and that the ship ran into it again by setting her fore-sail, and then drifted with it for a time; for had

the storm passed her she would have had fine weather, and the wind probably from the S. E. We cannot say also if it was not, though so very violent, a monsoon gale, which the season might well admit of, and the want of Barometrical observations tends to perplex our judgment the more. I have therefore marked only a conjectural track from the N. E. for this storm.

1833.

TRACK No. XXI. *Storms of the Brigs* BEE *and* VIRGINIA.

Documents from Capt. Biden, and Capt. Willie.

We have records of two considerable storms in the China sea, in this year, of which one at least was a true tyfoon, I think. The first was a storm occurring in August, in which the brig *Bee* was lost, the brig *Virginia* bound up the China sea, narrowly escaping it; and the second was a storm experienced by the H. C. S. *Lowther Castle,* of which a memorandum was obtained for me from her commander, by the Hon'ble the Court of Directors. I give here the documents, with the usual abridgments.

Extract from the Log of Mr. Willie, Mate of the Brig VIRGINIA, *bound to China, reduced to civil time.*

26*th August,* 1833.—Light 3 and 4 knot breezes S. W. to S. E., steering N. E. and N.E.bN. At noon latitude 15° 44′ N. P. M. breeze decreasing to a calm at midnight.

27*th August.*—5 A. M. light breeze, N. N. W., all sail set. At daylight *a bank of heavy black clouds in the E. S. E.* At 8 moderate, breeze North and cloudy. Till noon veering between N. N. W. and North. At noon, fresh breeze N. W. and N. Latitude observation 16° 10′ N., longitude account* 114° 26′ E. P. M. increasing from N. W.bN., and at 7 P. M. N. N. W. At 8-30 squally and rain, preparing for bad weather. At midnight fresh gale at N. W., with heavy squalls and rain at times.

* No longitudes are given in the Log, I have therefore, as the vessel's true position is of importance, worked it back from the Grand Ladrone.

28*th August.*—At daylight wind about N. W., thick stormy weather all round, with a heavy confused sea. At 9 A. M. increasing to a hard gale about N. W., at noon no observation. Latitude by account 16° 56′ N. longitude account 115° 26′ E. P. M. throughout hard gale with squalls and rain, veering from W. N. W. at 1 A. M., to West at 4, and S. W. at 7, wind *about* S. W.bS. at midnight.

29*th August.*—1 A. M. wind S. S. W., 4 A. M. South; daylight dark gloomy weather, scudding under bare poles with a heavy sea. Noon continued gale with thick cloudy weather. No observation. Latitude by account 18° 36′ N. longitude 115° 10′ E. P. M. wind Southerly throughout, weather moderating, squalls less frequent. Heavy confused sea.

30*th August.*—A. M. moderate, noon latitude observed 20° 8′, long. account 114° 17′. Ran N.bW. 86½ miles to—

31*st August.*—When at 8 A. M. Grand Ladrone bore North 6′ or 7′ distant.

Loss of the Brig Bee.

Copy of a Letter, dated Canton, September 21*st,* 1833.

I am truly sorry to announce to you the total loss of the good brig "*Bee*" and all her cargo, on the morning of 30th August, 1833, she having foundered with us, after a series of heavy gales and one tyfoon near the South Coast of China, in about latitude 21° 30′ North, longitude 112° 50′ East, about 15 miles off the Island of Huilingshan. All hands saved, except one man, who was drowned at the time she filled with water.

On the morning of the 28th August, we left the Capsing-moon, bound to New South Wales, in fine trim, and, I can safely say, every thing comfortable on board. We had hardly gone 20 miles, when it came on to blow very hard from the N. E., which obliged us to run to sea, and gain an offing before night, which we did, and at 6 P. M. hove to, a tremendous sea running at the time. We most fortunately rode out this gale very comfortably without any damage, and next morning, 29th August, it began to moderate a little, and the wind hauled round to the Southward, which was a very good wind

for me, as I intended to go out by the Bashee Passage. I therefore made sail under close-reefed top-sails and courses, steering East about six miles per hour till noon, when we observed, in latitude 21° 7′ N., and estimated longitude 113° 20′ E., a very heavy sea running, but the brig going along nobly. About 1 P. M. a tremendous gust of wind came on from the S. W., which laid the brig on her beam ends; I fortunately got the fore-top-sail, fore-sail and main-sail in before it struck us, but the main-top-sail was shivered to pieces; it then blew a perfect tyfoon, with a sea which I cannot describe striking us in all quarters; the bulwarks were very soon washed away on both sides, and a number of articles washed off the decks; some of the tremendous seas striking us under the counter and abaft, I began to be afraid that if it continued long, some of these seas would stave the counter in, or start some of the butt-ends abaft. Still the good old brig, although lying half the deck in the water, and the awful seas breaking over her, made very little water indeed. The Barometer was now 28.50. About 6 P. M. still blowing I may say a hurricane, and the sea in pyramids about us, I found the brig making more water, but nothing to be alarmed at. At midnight the same kind of weather, and found she was making more water. Immediately set to both pumps, and continued till 4 A. M., the brig gaining on us fast. At 4 A. M., found there was four feet water in the hold; immediately made what possible sail we could, for the purpose of running back to Macao or in with the Coast, as I expected we could not be far from it, supposing, from the sudden leak that the brig must be stove or have started a butt. I got the fore-top-sail on her and fore-sail, steering N. E., when she had gone about five miles, both pumps going, she came up in the wind against the helm, fell over her side, and filled with water immediately; we had hardly time to save ourselves by laying hold of the main rigging. Mr. Hays, the Chief Officer, and some of the men, were cutting the lashing of the long boat and of the other boats at the time; most providentially for him he got hold, but one poor fellow missed his, and we never saw him more. About 6 A. M., it cleared up a little, and we saw the land bearing W. N. W. of us, found that the wreck was driving fast towards the shore, all the people in the main rigging and chains, the sea making a clear breach over us; we all stripped of our clothing to a shirt or frock, in case we might be wash-

ed away, so as to be lighter in swimming, and there we hung in a most miserable state from 6 to about 11 A. M., when we were driven into the surf by the sea and current. Having the fore-top-sail set, and fore-sail hanging down, it assisted us greatly in getting sooner in shore, and most miraculously and providentially, we were driven into a very small sandy Bay, on each side of which were tremendous precipices of rocks, where if we had gone, all hands would have been dashed to pieces, and none left to tell the tale; but the mercy of God is great, and I am truly thankful for the saving of our lives. When we got into the surf, it was running so very high, and carrying every thing before it, that those of the people who could swim well, got hold of some boxes and spars, and took to the water for their lives. The brig very soon went all to pieces in the tremendous surf, and every body was washed hither and thither; most fortunately they all got on shore safe, but bruised." After being plundered and suffering much, the Captain and Crew reached Canton.

Captain Biden adds to this Log, the following Remarks

I was at Macao during the hurricane in which the *Bee* was wrecked, it raged with great violence accompanied with incessant rain, the sea broke over the Praya Grande, and doors and windows on the ground floor of the houses on the Praya Grande were in many instances burst open with the violence of the wind and sea together. The shipping in the Cum-sing-moon and Cap-sing-moon rode out the tremendous gale with yards and topmasts struck and with two anchors a-head. Several ships at Whampoa Reach dragged their anchors, and although the Chinese were as usual well prepared, by hauling their boats into every islet and creek between Macao and Canton, much loss and damage was sustained on the river.

We will now consider the track, which I have assigned to this storm.

The data for it are complicated by two circumstances, the first that we do not know, with the *Virginia*, when the S. Westerly monsoon replaced the S. Westerly gale, (which she found as of course on the S. E. quadrant of the storm,) and with the *Bee* that a storm coming, as this undoubtedly did from the S. Eastward, and impinging upon the high South Coast of China at so direct an angle as it must have done, must have been subject, at short distances from the Coast, (and the *Bee* was only 42 miles from the nearest point at noon on the 9th,) to great irregularities; of which we have abundant instances.

At noon on the 27th, the *Virginia* was just on the S. E. edge of the Macclesfield Shoal, and the "bank of heavy clouds in the E. S. E. was, I have no doubt, the outer barrier of the storm, travelling up from the S. E. between her and the Coast of Luconia.* To noon the next day, 28th, she made a course of 75 miles to the N. Eastward, and thus neared the track of the storm, but as the wind held to the N. N. W., she could only, fortunately for her, make this distance; but we find that the gale was veering rapidly with her, or 6 points in 7 hours, while she was hove to; or from noon on the 28th till 9 P. M. when the wind was so far to the South, that she could scud; a proof, that it was travelling up with great rapidity, and probably passing near her position. It had, moreover, I am inclined to think, not arrived at its full violence at that time. We find that as it ought to do, it began with the *Bee* from the N. Eastward when just outside, and that it veered to S. W., when she was laid on her beam ends. There is the anomaly of the wind being *South first*, and then becoming N. W. but as I have said we cannot account for these anomalies when so near the land.† Upon the whole then, I think we shall not be far wrong if we assign, as tolerably ascertained, a course from S. 40° E. to the N. 40° W. for this storm.

We should not forget that it is *possible* there may have been two storms, one from the E. N. E. and another from the S. E., which may have united near the *Bee's* position, and have caused the temporary moderating and Southerly wind which tempted her to make sail, the burst from the S. W. being the combined effect of both; but for this assumption, we have no sort of authority.

TRACK No. XXII.

LOWTHER CASTLE'S *Storm.*

Memorandum of the LOWTHER CASTLE'S *Storm from the India House.*

12*th October*, 1833.—H. C. S. *Lowther Castle* proceeding up the China sea. Latitude 16° 30′ N., longitude 117° 53′ E. Noon, Barometer 29.72, Thermometer 83°.

* See Col. Reid and various logs in my memoirs for instances of these banks of clouds.

† I have omitted to notice another source of uncertainty as to the *Bee's* position before noon of the 29th. I mean the heavy current to the Westward, which we know prevails at times on the South Coast of China in these storms.

Experienced a very severe gale commencing at N. W., and veering round to the E., and then abating in violence. It blew so hard while it lasted, that it brought us under a close reefed storm mizen try-sail, being compelled to take in the storm main and mizen stay-sail. The Barometer fell during the gale to 29.42 at 8. P.M. Shortly after which the gale moderated, and the Barometer gradually rose to 29.69. At noon on the 13th October, Thermometer 84°.

The *Lowther Castle's* storm, though apparently of small extent and of short duration, is a very remarkable one, both for the fall of the Barometer and the peculiar veering of the wind from N. W. to East, which, with allowance for drift, will give a track of about from N. 12° E. to the S. 12° W., which is much nearer the meridian than any we have yet found coming from the N. E. The memorandum is scanty enough, but I have thought it proper, on account of its probably peculiar nature, to mark a conjectural track for it, as serving to warn the seaman at this season of the year, that such small storms *may* arise. It seems certain enough, that we have rotatory storms of all sizes, and the only question in my mind is, *If the very small ones obey the same laws as the large ones, at sea and on shore?* or if not, where the difference begins? what is the law for the smaller ones? and what the cause of the difference? These questions I propose to investigate on a future day, and to do more than to advert to them here, would be somewhat foreign to our present subject.*

1835.

TRACK No. XXIII.

The Troughton's *Tyfoon, July* 1835.

Two severe Tyfoons occurred in the China seas in this year, during the height of the N. W. Monsoon, being those of the *Troughton* and the well-known one of the *Raleigh*; as the first occurring, I give that of the *Troughton.*

* As an analogous instance of a small storm of great violence, but in travelling about *from* SbE. to NbW. see Second Memoir on the Law of Storms, Jour. As. Soc., 840, vol. ix. The Cashmere Merchant's Storm.

The *Chinese Repository* for July 1835, Vol. V. p. 151, gives the following account of this storm, in which this unfortunate vessel was disabled, being afterwards plundered by the Chinese fishermen and Ladrones:—

"*8th July*, 1835.—The English bark *Troughton*, Captain James "Thompson, from London, and last from Singapore, arrived this day "in distress. It appears that on the 3d July, in latitude 20° 21′ N., "longitude 112° 53′ E., she experienced a very heavy gale from the N. "E., which was succeeded by a more violent wind from the S. W. The "wind blew to pieces the double reefed main top-sail, and from the "labouring of the ship in the cross sea the main mast gave way, carry-"ing with it the fore and mizen masts, the waves breaking completely "over the deck. During the three following days, the crew were "worn out by pumping, and working at the rigging of the jury "masts. By this time she was near the Mandarin's Cap, when "she was plundered." Details of this and of the sufferings of the crew are given at length, but these do not belong to our subject.

This unfortunately meagre record (for our purpose) allows us to do no more than to assign a conjectural track for this tyfoon, for from the changes of the wind it evidently was one. I have, therefore, with allowance for her drift, given it one conjecturally from the S.E.bS. to the N.W.bN., as it would clearly have been one from S. E. to N. W. had the vessel remained stationary while the N. E. storm lasted; and I have made the line of track to pass 60 miles to the S. W. of the latitude and longitude given on the 3d, as the ship must have drifted to, at least, that distance to the S. W. into the path of the storm, so as to have had the centre passing over her.

TRACK No. XXIV.

The Raleigh's *Tyfoon, August* 1835.

I was at first inclined to omit the details of this storm as appearing almost a useless repetition, but my object being to collect here *all* the details of *all* the storms in the China seas of which any record exists, it would have been imperfectly fulfilled, had I not inserted the results of the valuable labours of Mr. Redfield and Col. Reid, relative to this remarkable storm. The following, then, is copied from Mr. Red-

field's Pamphlet, and I need not say, that the track is that laid down by him :—

The facts which have been chiefly relied on for establishing a South-western course for this gale, are contained in the report of H. M. S. Raleigh, which was overset and disabled in this gale, in the China sea, when under bare poles, which report I have as follows :—

" H. M. Brig *Raleigh*, August 1, 1835.—Working out of Macao Roads at noon S. E., end of Formosa N. 85° E., 340 miles. Fine weather all day. August 3d at noon, S. end of Formosa N. 82½° E., 252 miles. Fine weather all day. August 4th, 10h. 20m. a. m. close reefed top-sails and courses, 12h. 30m. p. m. barometer fell from noon 15.100: took in main-sail and fore-sail—at 9h. 30m. got all snug, vessel going through the water between three and four knots ; barometer 29.40, falling ; at 7h. 30m. wind veered to N. N. E. and tyfoon commenced ; at 8 p. m. barometer 29.36 falling ; 8h. 30m. tyfoon increasing ; 10 p. m. close reefed fore try-sail and set it, tyfoon veered to N. E. with a heavy sea ; at midnight tyfoon increasing ; barometer 29.04, falling.

" August 5th, 3 a. m. tyfoon veered round to E. S. E. still increasing in violence ; 6h. 30m. barometer 28.25 ; 8 a. m. tyfoon increasing ; 9h. 30m. a. m. if possible blowing heavier, ship went over ; in this awful situation ship lay for about 20 minutes ; 9h. 50m. lower masts went by the board and ship righted with seven feet water in her hold ; barometer did not fall lower ; at noon tyfoon moderated a little ; at 6 p. m. tyfoon more moderate, with a heavy sea ; midnight, strong gusts of wind with heavy sea from South."—*Abridged from Canton Register of March* 14, 1837.

See also the log of the *Raleigh*, as it appears in Col. Reid's work, which contains a sketch, shewing the position of the *Raleigh* as given in the log, and illustrating the direction of the wind. Col. Reid has also given the position of a schooner, which encountered the tyfoon in latitude 18° 2′ N., longitude 15° 50′ E., of which I had previously received no account. I will now submit such evidence as I possess, in addition to the account furnished by the *Raleigh ;* adding also a sketch and figure, illustrating the course and progress of the tyfoon, and which was prepared and stereotyped some months since in reference to furnishing an account of this hurricane.

At Macao, where the tyfoon was experienced on the 5th and 6th, many houses were greatly damaged ; also many lives were lost in the inner harbour, and some vessels driven on shore. The direction and changes of the wind at Macao are not stated ; but we are favored with the following valuable table of the state of the barometer during the period of the storm :—

5th August.								
H. M.		Barometer.	H. M.		Barometer.	H. M.		Barometer.
1 0	A. M.	29.47	0 45	A. M.	28.30	6 45	A. M.	29.12
2 30	P. M.	29.28	1 20	,, (lowest)	28.05	7 45	,,	29.20
5 0	,,	29.20	1 25	,,	28.08	8 15	,,	29.21
7 20	,,	29.12	1 45	,,	28.20	8 45	,,	29.23
9 0	,,	29.08	1 55	,,	28.30	9 30	,,	29.27
10 20	,,	28.95	2 0	,,	28.37	10 25	,,	29.30
10 45	,,	28.90	2 25	,,	28.56	11 0	,,	29.34
11 5	,,	28.85	2 45	,,	28.68	2 0	,,	29.42
11 30	,,	28.75	3 10	,,	28.75	and continued rising to		
11 53	,,	28.65	3 40	,,	28.83	29.65, at which point it		
6th August.			4 10	,,	28.90	usually stands during fine		
			4 45	,,	28.97	weather."—*Canton Register, August* 15.		
0 15	A. M.	28.50	5 10	,,	29.02			
0 30	,,	28.40	6 0	,,	29.08			

This table affords in itself good evidence of the passage of the centre of the vortex near to Macao.

At Canton (60 miles North of Macao,) the tyfoon began on the evening of the 5th, after three or four days of very hot weather, with Northerly winds, and continued throughout the night and the next day. Its violence was greatest about 2 o'clock on the morning of the 6th. The following is an account of the state of the Barometer and Winds at Canton.

This relates to "fine weather" of the S. W. monsoon; the mean of the Barometer for July and August being at Canton 0.40 inch lower than for December and January in the N. E. monsoon. This Barometer at Macao appears to stand about 0.15 or 0.20 inch lower in its adjustment than that used at Canton for the reports in the Canton Register, the mean of which for five years is 30.027. Many if not most of the common ship Barometers stand too low in their adjustment.

4th August.

9 A. M.	Barometer	29.79	N. W.	fine weather.
4 P. M.	,,	20.70	N. by W.	moderate breeze.

5th August.

9 A. M.	,,	29.62	Wind N. and N. W.,	fair weather.
4 P. M.	,,	29.54	,,	unsettled rain and fresh breeze.
12 P. M.	,,	29.37	,,	N. blowing hard and in heavy gusts.

6th August.

5 A. M.	,,	29.34	Wind N. E.	blowing hard with heavy rain.
9 A. M.	,,	29.51	,, S. E.	,, ,,
11 A. M.	,,	29.58	,,	blowing hard, moderating.
5 P. M.	,,	29.70	,, S. E.	,,
11 P. M.	,,	29.85	,, S. E.	,,

7th August.

8 A.M. *Barometer* 29.94. *Wind S.E. cloudy. Compiled from the Canton Register.*

On Wednesday the 5th instant, a tyfoon swept over the city of Canton. It began in the evening and continued throughout the night and the next day, blowing its best about 2 o'clock in the morning. The damage done by the tyfoon at Canton is small, but not so at Kumsingmoon, Macao, and elsewhere on the coast.—*Canton Paper.*

The American ship *Levant*, Captain Dumaresq, which arrived on the 7th of August, the day after the gale, came in with royals set, from Gasper Island, in fourteen days, having had light winds all the way up the China sea, and *did not feel the tyfoon.* This important fact is stated in the *Canton Register* of *August* 11.

Extract from a private letter from on board the ship *Lady Hayes*, which left Macao roads a day or two before the storm, and returned to Kumsingmoon after the gale.

" Early in the morning of the 5th, we observed indications of bad weather. At 10 A. M. the wind freshened a little from the same quarter, it had been for the last twenty-four hours, viz. North, so we thought it best to turn her head back again to look for shelter, fancying ourselves to be about thirty-five miles off the land. We carried a press of sail until noon, when we found we had too great a distance to run before we could get into shelter, and expecting it would get so thick that we could not see our way ; so we turned her head to sea, and clapped on as much sail as she could stagger under, *steering S. E. by E.* The wind being then at North, we were desirous of getting as far off the land as possible, expecting the wind round to the Eastward, there being a most *tremendous swell* from that quarter. *At* 4 P. M. it was blowing in severe gusts, and shipping a good deal of water, and the ship becoming unmanageable. About 8h. 30m. *the wind began to veer to the west*, but continued to blow as hard as ever, till midnight, when it *drew round to South*, and moderated a little. It continued to blow hard from that quarter until noon of the 6th, when it moderated fast, and we began bending other sails in room of those that were split. When the gale commenced, which we consider it did *at* 1 P. M. *on the 5th*, we were about twenty miles East of the Lema ; where we were when it ended, it is hard to say as we saw nothing till the morning of the 7th, when we made Mondego Island. We hardly think we could have had the gale so heavy as those inside, and what is most extraordinary, the wind with them veered to the *Eastward round to South* ; but with us it veered to the Westward ; for had it veered to Eastward, we should most likely have been driven on shore among the Islands, as we could not have been more than fifty miles off the land (?) at 8 P. M. on the 6th.—*Abridged from the Canton Register of August* 18.

On the reduced chart, which is given herewith, the tracks of the *Lady Hayes* and the *Levant* are laid down by estimate from the printed accounts.

The small dotted circle B., surrounded by the storm arrows, is supposed to indicate the position of the centre of the storm at the time the *Raleigh* was overset; and the position of the latter should be marked somewhat nearer this circle, according to the latitude and longitude of the *Raleigh* on the 5th, which Col. Reid has given in her long. The course of the storm appears to have been N. 72° W., and its centre is supposed to have been opposite the *Raleigh*, about 8h. 20m. A. M. on the 5th; but this cannot be ascertained with precision, as the indications of the Barometer do not appear to have been closely watched and recorded during this terrific period of the storm.

Having shewn the rotatory character of these tempests, I consider the depression of the Barometer which attends them, as being due to the rotative action; and the point of greatest depression as indicating the true centre or axis of the storm. From the evidence now before us, we arrive at the following facts :—

1. That the *Raleigh* met a gale which set in with the wind at N., *veering round by the E. to E. S. and South.*

2. That at the harbours and roads "inside," (Macao, Kum-sing-moon, &c.) as well as at Canton, the gale occurred *at a later period;* and the wind *also set in at North, and veered to E. and S. E.*, in a manner similar to that reported by the *Raleigh.*

3. That with the ship *Lady Hayes*, off the islands near Macao, the wind also set in at North; but the ship steering S. E. by E. under a press of sail (and doubtless falling off with the heavy sea from Eastward) and wind, towards the middle of the gale, began to *veer towards the West, whence it drew round to South* towards the close of the gale.

4. That the violence of the wind was apparently greater with the *Raleigh*, than with the *Lady Hayes.*

5. That the gale was experienced by an English Schooner, August 5th, in latitude 18° 2′ N., longitude, 15° 50′ E. ; but the *Levant* arriving on the 7th in her course through the China sea, *did not encounter the gale.*

6. That the fall and rise of the Barometer at Macao and with the *Raleigh*, and the strength and changes of wind with the latter, were such as are often exhibited near the centre of a hurricane; and that the minimum depression of the Barometer occurred about *seventeen hours later at Macao* than with the *Raleigh.*

These facts seem to establish the following conclusions :—

1. That the tyfoon advanced *in a Westerly direction.*

2. Negatively—that it did *not* pass through the China sea, from N. E. to S. W., nor on the opposite of this course.

3. That it was a *progressive whirlwind storm*, turning to the left, round its axis of rotation.

4. That its centre of rotation passed to the *Northward* of the *Lady Hayes*, and to the *Southward* of the *Raleigh* and of Canton, and the an-

chorages near Macao; and nearly on the line A. B. C. as marked on our chart.

5. That the rate of its progress was about *seventeen nautical miles per hour.*

6. That the extent or diameter of the violent part of the gale, as deduced from its duration and rate of progress, was about four hundred nautical miles, or equal to six or seven degrees of latitude.

7. That the latter induction agrees with the geographical evidence, which has been obtained of the visitation of the storm.

The progress of the tyfoon being taken at 17 miles per hour, it follows that the excess of velocity of the wind at E. with the *Raleigh,* over that of the wind at W. with the *Lady Hayes,* supposing the rotation to have been in a circle, would be more than thirty miles an hour; allowing nothing, however, for difference of retardation of the surface wind, and not taking into the account the additional retardation which the West wind of the *Lady Hayes* must have been subject to, in its recurving course over the land. If a circle be drawn on the chart around each of the points B. and C., with a radius equal to 3 or 3½ degrees of latitude, these circles will comprise, somewhat nearly, the field of action of the storm at the two periods of 9 A. M. of the 5th, and 2 A. M. on the 6th of August.

The progressive velocity and course of this tyfoon is nearly the same as that of the Trinidad hurricane of June, 1831; and the rate of progression also corresponds nearly to that of the Antigua hurricane of August 12th, 1835. See Tracks Nos. I. and V. on my chart of the courses of hurricanes in the April No. of the *Nautical Magazine,* 1836.

This examination of the case before us, appears to shew, that the direction of rotation, and the course of progression of this tyfoon, which crossing the China sea, agrees with those of the hurricanes of the West Indies; and that its course was not controlled, or materially influenced, by the existing South-west monsoon."

1836.

I have only the following notices of a storm in this year, from the *Chinese Repository* :—

About 29th July and 1st August, 1836, a severe gale was experienced on the South Coast of China, which was very destructive to the shipping in the China seas. The bark *Susanna* of Macao, and the *Admiral Buyskes,* a Spanish ship, were lost with a part of their crews. Apprehensions were felt for two or three other ships, the *Hormasjee Bomanjee, Hamoody,* and *Margaret Graham.*

The *Repository* of September says, in reference to this: The *Hormasjee Bomanjee, Hamoody,* and *Margaret Graham,* are given up

as lost. On the 31st July, at 10 A. M., the *Alexander*, Captain Wilson, from Macao to Singapore, was wrecked in latitude 10° 28′, longitude 111° 27′ E. No lives lost, but no property saved. The *Hamoody* is said to have reached Manilla.*

TRACK No. XXV.

Tyfoons of the ARIEL *and* VANSITTART, 16*th to* 22*d Nov.* 1837.

I have been favoured by Capt. Burt, with the Log of the ARIEL, *of which the following is an abstract reduced to civil time.*

15*th November*, 1837.—The Barque *Ariel*, bound to China, was at noon in latitude 15° 1′ N., longitude per chronometer 116° 15′ E. with fresh gales from N. N. E., hazy weather and heavy sea on; having increased to this from a steady breeze at midnight of the 14th, vessel standing to the EbS. going 7 and 8 knots. P. M. wind marked N. E. and to 10 P. M. standing to the East; gale increasing rapidly to midnight. At 10, wore to the Northward.

16*th November*.—Wind N.E. to noon; heavy cross sea running very high. At 8, wore to the East, lost mizen-topmast. Noon hard gales N., mountainous sea, latitude observation 15° 8′ N., longitude 116° 45′. Wind about N.N.E., P. M. wind N.N.E. to midnight.

17*th November*.—Gale still increasing and "every appearance of a dreadful tyfoon. Barometer still high at 30.10, and Sympiesometer as usual. Daylight wind hauled to the North in a tremendous squall; 10, blowing awfully hard, and sea beyond description. Noon tyfoon blowing dreadfully, wind N. W. and sea like pyramids all round, could not look to windward, for the wind, rain, and sea blowing on board; the ship frequently lurching half the main rigging, and oftentimes the bowsprit under water. Barometer fell to 29.80. P. M. wind West, a most dreadful tyfoon blowing, ship in a most perilous situation. At 2, wind N. W., and then for two hours till 4 P. M. I really cannot describe the scene; the ship rising with difficulty to several of the lurches got all ready to cut away the masts. At 4

* These are too vague to mark any track from, but they may serve as memoranda. I shall be glad to receive the logs of any vessels which may have experienced this storm.

P. M., the ship lay over so much, that half the lower yards were in the water, saw that she was settling down and upon her beam ends, the water being up to her main hatch. Cut away the main-mast, which carried away the mizen-mast and fore-top-mast with it. Ship righted, three feet water in the hold, sea breaking over us in all quarters. At* —— P. M. the Barometer began to rise, and was at 29.90; and at 6 P. M. at 30.10; during the whole of the night it still blew tremendously, wind veering from N. W. to W. S. W. and South, with constant rain.

18*th November.*—At day-light still blowing hard, and an awful sea running. At 10, wind hauled to S. E., when it began to moderate. Noon, strong gales from the S. E. and sea running, but every appearance of the gale breaking up. Set storm-fore-staysail and hauled up to North, supposing we were well to the West of the Scarborough Shoal, in the neighbourhood of which we must have been all night.

"During this awful tyfoon, the Barometer gave no indication of its approach, for we were under bare poles a long time before it fell, it being all the time at 30.10, then it fell to 29.80, and again it rose to 30.10—15—25 to 35, still gale blowing as hard as ever, and at noon it was at 30.90." No observation. P. M. strong gales from S. E., hauling to East. At 3 P. M. gale again increasing with threatening appearance all round. 3h. 10m. saw the breakers on the Scarborough Shoal, one or two miles off, bearing N. W. by N. to E. N. E., sea breaking mountains high upon it; bore up to the W. S. W. to clear it. 6 P. M. severe gales from the N. N. E. with dreadful weather, sea washing over us in all quarters. At 10, hove to, vessel being very uneasy, and at times severely struck by the sea. Midnight very severe gales from the Northward, with continued rain and an awful sea.

19*th November.*—Day-light the same severe gales and dreadful weather with constant rain, and so thick, we could not see the length of the ship. Wind N. N. W. and tremendous sea. Noon moderating, and wind hauling to the N. N. E. From noon 18th, Barometer *rose* from 30.35 to 31.30. P. M. wind marked N. E. Strong gales, constant rain and awful sea, which we were shipping all over us. After

* Blank in MSS.

consultation with the officers, bore up for Singapore at 3 P. M., running West till midnight.

20*th November.*—Midnight gale increasing again, and heavy seas breaking fore and aft, hove to again till daylight, when severe gales from N. N. W., bore up and scudded under the storm staysail. Noon more moderate, but blowing hard with an awful sea. P. M. strong gales from N. E. with heavy rain, sea falling a little. Midnight more moderate.

21*st November.*—Noon fresh breezes from N. E. to midnight, with dark squally weather, but decreasing wind and sea.

22*d November.*—Decreasing to light breezes from E. N. E. and fine; a long, heavy, turbulent sea on. Noon, light Easterly winds and a heavy sea. Latitude 12° 38′ N., longitude 112° 5′ E.

Memorandum of the VANSITTART'S *Storms off the Coast of Luconia,* 17*th to* 22*d November* 1837, *by Capt. Macqueen, then commanding her.*

From the East India House.

"17*th November,* 1837.—In latitude 15° 55′ N., longitude 119° 30′ E., my ship, the *Vansittart,* encountered a severe gale of wind, commencing at sunset with tremendous gusts from the N. W. with lightning and rain. About midnight it blew a perfect hurricane, the wind gradually veering round to the S. W., which caused a very heavy sea. Next morning the weather moderated with the wind at S. E.; made sail, and at noon on the 18th, sighted Cape Bolinao. At 6 P. M. on the 19th, the gale recommenced with increased fury from the N. E. and continued with little intermission for the four following days."

I should observe here, that I have copied this memorandum literally, for reasons which will hereafter appear.

In considering the foregoing storms, I shall first commence with those of the *Ariel,* (for as I shall afterwards shew, they are different from those of the *Vansittart,*) and of course with that first in date.

The *Ariel's* position is fortunately well ascertained on the 16th by observation, and on the 18th by working back her run from 3h. 10m. P. M. when she sighted the Scarborough Shoal. Her drift made good, then, during this 48 hours is S. 75° E. 62 miles, which agrees as nearly as possible with what appears from careful projection to have been, up to this time, the track of the storm, *i. e.* about on a line S. 75° E. to N. 75° W. Another instance in addition to those before quoted of ships being sometimes drifted round the quadrant of a storm, so as to arrive, at the conclusion of it, at a point in the first storm circle, opposite to that at which it commenced with them. The *Ariel* appears also from the terrific violence of the wind, the pyramidal sea, and the rapid veering of the wind from North at day-light of the 17th to about South, at midnight of the same day, or 16 points in 18 hours, to have been drifting close past the centre.

From this time, however, it appears, that the storm must have curved away to the W.S.W. and S.W., so as to bring the ship upon its North Eastern quadrant, and the wind consequently to S.E., at which it remained from 10 A. M. on the 18th till 3 P. M., when the sight of the breakers on the Scarborough obliged them to bear up. By 6 P. M., they had again severe gales from the N.N.E., the wind having hauled round by the East. I consider that this was the beginning of a second storm, but that it was, as will be shewn in the log of the *Vansittart*, a storm occasioned by the N. E. monsoon setting in with the force of a gale, and not a rotatory one, for the ship though suffering very severe weather, had the winds constantly between N. N. W. and N. E. only, till they obtained fine weather, though running to the Westward. Had this second gale been a circular storm, it must have overtaken and passed them when hove to, when it would have veered either by the East or West, but this *vibrating* of the winds, as above, is like that of a strong monsoon gale, disturbed on its course by the *Vansittart's* and *Ariel's* storms, and we have I consider, no data whatsoever from which to consider it a circular storm; I have thus not marked it on the chart.

We now come to consider the *Vansittart's* storms. These it is evident could not be the same as the *Ariel's*, for the ships were at least 170 miles apart, the *Vansittart*, bearing N. E. by E. ½ E. from the *Ariel* at noon on the 16th, when this last had an awful tyfoon at

N. W. with its centre close to her; that of the *Vansittart* beginning only at sunset on the 17th—the memorandum which I have exactly copied evidently relating to civil time,* though it is not said so.

The *Vansittart's* second storm is, I think, also clearly a monsoon gale, as there is no account of its veering or changing. I have therefore marked her first storm, conjecturally only, parallel to our track No. V. as passing Cape Bolinao, and travelling to the W. S. W.

The singular phenomenon of the Barometer's giving no warning, remaining so high, and falling so little in such a terrific tempest, is most remarkable. Our first care is of course to ascertain, that it really occurred, before reasoning about it. I wrote to Captain Burt, who was then Chief Officer of the *Ariel*, requesting to know if there was any reason to mistrust the Barometer in any way? if they had compared it on arriving at Macao? &c. His answer is as follows:—

"We had no reason to mistrust the Barometer, as it had always indicated any change in the weather correctly. I am not aware whether Captain Warden compared it with any other in Singapore or not; he was then in command of the *Ariel*. It is not the same glass we have at present. It was on board the ship 18 months after the tyfoon, and we always found it true."

There seems then little doubt that the anomaly did really occur; the question then is, "To what can it be attributed?"

If, as I have shewn, we suppose the two storms approaching the same point, the *Vansittart's* from the N. E., and the *Ariel's* from the E.S.E., with a heavy N. E. monsoon behind the former, blowing through the whole extent of the trade wind across the Northern Pacific, and unchecked, except partially by the N.W. point of Luconia, we shall have three causes, all tending to augment the atmospheric column not far to the Westward of where the *Ariel* was on the 16th. I can see no other more simple or more probable explanation. It is however an anomaly to be carefully borne in mind by the seaman, and by all who investigate the *Law of Storms*, and the more so, that even the Sympiesometer also gave no indication of the approaching mischief.!

* If we were to call it nautical time, "sunset of the 17th" would be sunset of the 16th civil time, but there is still a discrepancy wholly irreconcilable, for the *Ariel* had then had her tyfoon blowing for at least 6 or 9 hours from the N. N. E. The high land of Luzon cannot have occasioned all this anomaly.

1838.

For this year the only notice I have obtained of, apparently, a severe storm, is the following from the *Chinese Repository* of September 1838.

The bark *Claremont* having sprung a leak, foundered near the Ladrones on the 24th September. She encountered a gale on the 22d in lat. 19° 2′ N. and long. 114° 50′ E. As this gale is not noticed as having occurred in China, it was probably either of small extent if the *Claremont* suffered from its Southern quadrant, or one passing to the Southward of this latitude if she had the Northern quadrant of it. We cannot even conjecture its track from this notice, but as before observed, the date is always a record worth preserving.

1839.

The Sunda's *Storm.*

The British bark *Sunda,* by an account printed in the Canton press, saw on the 7th October, 1839, at 6 P. M. the land of Tyloo, N. E.bN. distant about 35 miles, weather very unsettled, and Barometer falling fast. All preparations for bad weather were made, and at 9 o'clock, the wind suddenly veered from N. N. W. to N. E.bE. and blew a strong gale, when many of the sails were blown from the yards. At 3 A. M. of the 8th, it blew a hurricane accompanied with a tremendous sea. At 8 A.M., it abated a little, but the sea more violent, and tossing in all directions; from this time the wind continued to abate, but it still blew a strong gale with a heavy sea till the 10th, when it became moderate, the wind from the N. E. Vessel very much disabled by the loss of her top-masts and sails. On the 11th, it was fine, at 4 A. M. saw the Taya Islands W. S. W., distant 8 miles, when she bore up and anchored under the lee of one of them, but in the evening it again came on to blow from the E. N. E., when the cable parted, and she was wrecked. The crew were kindly treated and sent to Canton by the Chinese authorities.

I am inclined to consider this storm as only a violent monsoon gale, for there seems to have been no veering of the wind which could authorise us to consider it a rotatory storm. We have many cases in which the monsoon does sometimes set in with a gale rising almost to the force of a hurricane, and the season was sufficiently advanced for an early monsoon to begin. In Mr. Redfield's table of

the changes of the monsoons, compiled from the *Canton Register*, it appears that in 1831 the change took place between the 1st and 14th October, and in 1830, from the 5th to the 12th October. This valuable document comes down only I regret to say to 1835, and I have not been able to find any source from which to continue it, or at least to ascertain the setting in of the monsoon for this year.

TRACKS No. XXVI AND XXVII.

The THETIS *and* GOLCONDA'S *Tyfoons.*

In No. CXIX of the *Journal of the Asiatic Society*, I published as my Fourth Memoir on the Law of Storms, accompanied by a chart, a detailed investigation of these two storms, in one or both of which, (for she might very possibly have been caught at their junction,) the unfortunate *Golconda*, with the head-quarters of the 37th Madras Native Infantry, and 300 troops on board, appears to have foundered.

In this it is clearly shewn, from the logs of the Ships *Thetis of London* and *Thetis of Calcutta*, which were almost in company with the *Golconda*, that they fell in, about the Macclesfield Bank, with *two* storms, one of which travelled from the S. 78° E. to the N. 78° W. passing about 100 miles to the North of the Macclesfield, and the other travelled from S. 10° E. to about the North 10° W.* Of the three Ships, the one, the *Thetis of London*, to all appearance perfectly aware of his position, with an excellent Simpiesometer and Barometer on board, the first oscillating *for twenty-four hours* before the gale! hove to at the right time and place to avoid running across the track of the storm, and received no injury. The second, the *Thetis of Calcutta*, with less warning, having no Simpiesometer on board, and being tempted by a fair S. West wind, ran on till she was in great danger, and finally lost her mainmast, had three feet water in her hold and was in great danger of foundering from her pumps being crushed by the fall of the mast.

The third, the unfortunate *Golconda*, which was but a short distance ahead, was in all probability lost by running into the centre of one of the storms.

I subjoin as an epitome of the evidence upon which this conclusion

* This and the Lowther Castle's Storm p. 679, are the first Storms I have met with, the track of which was so near the Meridian.

is founded, the comparative table from the logs of the two *Thetis'*, and must refer those who are desirous of further details to the memoir itself, in which I have endeavoured scrupulously to discuss the evidence, so as to have no shadow of doubt that there *must* have been two storms, and that their tracks cannot have been far from where I have laid them down.

Tabular View of the Hurricane of 22nd to 24th September 1840, in the China Sea, as experienced by the ships THETIS OF LONDON *and* THETIS OF CALCUTTA.

Date.	Ships' Names.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	REMARKS.
			° ′	° ′				
19th Sept. at Noon.	London Thetis,..	Light Southerly. hot and sultry weather	14 26	113 39	29.94	0	86½°	
	Calcutta Thetis,	Light SW. airs and fine,	14 44	111 15	29.79	0	92°	
20th Sept. at Noon.	London Thetis,..	Calms and Light SE. airs, sultry, ...	14 53	114 9	29.90	0	87	At Midnight squally weather.
	Calcutta Thetis,	SW. and WSW airs and fine,.....	12 40	111 57	29.79	0	89	
21st Sept. at Noon.	London Thetis,..	Light NW. winds, gloomy and close, ...	15 57	115 9	29.87	29.30	84	Noon rain, thunder and squally; wind NW. Simp. very unsteady during this 24 hours.
	Calcutta Thetis,	Light from WNW. till 7 P.M. at 7 breeze freshening from NNW. thick cloudy weather, ...	13 20	112 40	29.70	0	89	

Date.	Ships' Names.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
22nd Sept. at Noon.	London Thetis, ...	NNW. Increasing breeze and sea,	16·20	115·30	29·61	29·12	85½	Threatening; sea rising; glass falling, and wind increasing; hove to.
	Calcutta Thetis, ...	W. by S. strong breezes, ..	14·55	114·55	29·56	0	86	Increasing with gloomy weather; running to the NE.
22nd Sept. at Midnight.	London Thetis, ...	WNW. violent gale, terrific squalls, ...	0	0	0	0	0	Bar. still falling.
	Calcutta Thetis, ...	SW. Increasing and incessant squalls; running to the NE. and NW. since noon, ...	0	0	0	0	0	Sea getting up from SW.
23rd Sept. at Noon.*	London Thetis, ...	SW. almost a hurricane,	16·40	116·15	29·20	28·73	0	No abatement.
	Calcutta Thetis, ...	SW. furious tyfoon, lying to, ...	15 50	115·13	28·80	0	0	High sea; lost mizen topmast.
23rd Sept. at Midnight.	London Thetis, ...	About South, moderating fast, ...	0	0	29·50	0	0	Bore up at 5 P. M. Sea higher than in the gale.
	Calcutta Thetis, ...	SW. Heavy tyfoon, squalls not so frequent, ..	0	0	0	0	0	Sea very cross.
24th Sept. at Noon.	London Thetis, ...	SSE. Moderate, ...	18·25	117·20	29 80	0	81½	Fine and squalls, wind SE. and moderate to Macao.
	Calcutta Thetis, ...	S. Gale breaking, ...	17·14	115·35	29·40	0	0	AM. Rolled away the main mast, &c.; at 8 PM., wind SSE.

* Golconda probably lost about this time.

1840.

The Oneida's *Tyfoon.*

October 1840, *from the Singapore Free Press.*

The following notice of a tyfoon in the China seas was elicited by the public notice of the Indian Government, of October 1839, published at my solicitation, requesting information from all persons on the subject of storms. It is, unfortunately, the only account we have of this storm, and though a good one, wants so many of the data from which to lay down its track, that all we can do is to notice it as a heavy tyfoon from *about* East or E. S. E. in *about* latitude 18° 40′ to 19° North, and *about* on the meridian of the Paracels.

TO THE EDITOR OF THE SINGAPORE FREE PRESS.

Dear Sir,—Noticing in your paper a request on the part of the British Government for information relative to storms, it seems incumbent upon me, visiting this port to repair damages sustained in one, to make a few observations, which though they may not be sufficiently close to aid the cause of science much, may be of interest to the general reader, or seaman, to whom I shall more particularly address them. I sailed from Canton on the 13th of October, and lost sight of the land about 5 P. M. Through the night and the next day the wind was N. E. and steady, and the general aspect of the weather was that which we see on sounding, or when the atmosphere is lit up by the reflection from 'green water,' as termed. At 9 P. M. I noticed the mercury to have fallen 20 parts of an inch from its usual standard at Canton for October, but apprehended no change, as it is liable to fall on approaching a lower latitude, and the weather continued good, wind having hauled about N. N. E. At 11 P. M. the barometer was 29.70, with more wind and a small swell from the Northward. At 3 A. M. it had fallen more, and appearances were changing in the thin misty clouds that were hurrying over and as fast collecting again. At 4 A. M. the mercury stood 29.50; and to be on the safe side, I double-reefed the topsails, furled the main sail and jib, and sent the royal-yards down, expecting an 'Easterly Gale.' At 5 A. M. the barometer had fallen lower, and the gale

coming on thick and fast, without any indications to windward of more settled weather, I was forced to expect a hurricane against my previous opinions, supported as they were by the season, and the absence of those earlier indications, save the swell, that are usually considered a prelude to these tempests. Supposing in that even, that the wind would haul to the West as it then had to the North, brought the ship to three points, or S. W. by W., put preventers upon the yards, determined to carry sail at every hazard, and run from the gale as the rotary theory would seem to intimate,—but there was more to be feared from the North Paracel Shoal, inside, or to the West of which, I suppose we were. The top-gallant-yards were coming down between this and 7 o'clock, when it was full late to reduce sail; and the mizen-top-sail being in and the others upon the cap, I knew no end more conducive to our safety, than to carry on and let them blow away, which they soon did in a yaw to windward, leaving the fore-top-mast-stay-sail to veer under, which brought us round in a lurch that put at rest all further exertion to secure anything to leeward, or do much elsewhere, for the air was full of foam and spray. At 10 o'clock I found the wind had shifted within the last 20 minutes to W. S. W. and blew much harder than before, carrying the ship well over, or as near on her beam-ends, as is generally understood by that term when applied to ships laying in violent tempest that have not entirely capsized. I had not seen the barometer since last noted, for the passage to it was lumbered up, and I was more intent upon the compass, and thinking of the shoal, to leeward; but the Mate, who succeeded better, said it was 28.36′. One of the lee cabin dead-lights at this time burst open, and I believe the ship might have been lost from that cause alone, had no one been present, or the hinges have gone; for that side was under water. At 11 o'clock the mercury was up, but it was doubtful when it had moderated. At 12 P. M. it certainly had, and at 2 P. M. we were looking about us again. (We found the jibboom and appendages carried away, and a whole suit of sails from 'top to bottom,' for those that were furled had blown from the gaskets, and those sent down could not be secured to leeward and were lost—other spars, bulwarks, &c. were gone.) At noon of the next day, after sailing through the night and forenoon $1\frac{1}{2}$ to 2 knots West against the swell, I found we were twenty miles North of the *North Paracel Shoal*, and on its meri-

dian, which shewed that the S. W. current I had expected, and which is usually provided against in this vicinity, did not exist, and gave cause for the smoothness of the water that favoured us during the gale. We found the ship strained and badly chafed about the upper works and rigging, and not in a fit condition to enter the Indian ocean. This ship is considered one of the best built of American vessels, and probably any other; it may therefore not be improbable that more serious accidents have happened to others less favoured, if any were within the range of its influence

Whatever opinion may be entertained about the generation and motions of winds—it is not a new thing that deep gulphs, narrow passages, high lands, and extensive shoals, exercise a great influence over them; and the spot in consideration may be indebted to its known propensity for gales to that cause alone, as also the gulph of Mexico and California on the opposite side, and other deep indentations of coast.

Yours, &c.

George Barrell,

Master of the American ship Oneida, lately from China.

Singapore, Nov. 2, 1840.

TRACK No. XXVIII.

Magicienne *and* St. Paul's *Tyfoon.*

The following are the only notices I have been able to procure of this remarkable storm :—

30th November, 1840.

Magicienne *and* St. Paul's *Storm.*

The *Ariel* left Macao roads on the 30th November, having had fine weather with N. E. breezes on the 29th. At noon 30th, latitude account 20° 46′ N., longitude 113°, fine 7 knot breeze N. E.

Loss of the French Frigate Magicienne.

During the week some indistinct rumours had reached this place (Singapore) regarding the loss of the *Magicienne,* which have received unfortunate confirmation by the arrival of the *Iberia* from Manilla;

and the following brief particulars have been handed us by a gentleman, who has derived them from an authentic source.

On the 27th Nov., which was just a month after her departure from this port for Manilla, the *Magicienne* encountered a very strong gale in the *Palawan Passage*, which by the 29th had increased to a tyfoon, in which she lost her masts, and received so much damage in her rudder that she became unmanageable, and about 2 A. M. on the same day, she was carried by a strong current on to the Bombay Shoal,* to the N. N. W. of *Palawan*; and in this state borne on by a terrible sea, was dashed on the reef, where she instantly went to pieces. The crew immediately betook themselves to the construction of rafts, to reach a safe shore; but fortunately on the third day, the whole ship's company were picked up by two English vessels, the *Mysore* and *Clifford*, and the French vessel *Favorite*, on board of whichthey were conveyed in safety to Manila, where they arrived on the 15th instant. The French Corvette *Danaide*, left Manila on the 3d instant, for the scene of this disaster, with the intention, as was supposed, of recovering every thing that could be saved from the wreck, and had not returned by the 26th.—*Singapore Free Press*, 31*st Dec.* 1840.

The American Ship St. Paul.

The following account of a severe gale, which the American ship *St. Paul* encountered in the China sea, on her way from Manilla to this port, where she arrived in the course of the week, has been handed us for publication :—

" The American ship *St. Paul*, G. Pevice, commander, sailed from Manilla on the 26th November, having fine weather and the wind at from E. to N. N. E. until the 29th, sea account; the wind then freshened into a strong gale at N. E. Latitude 12° N. longitude 112° 23′ E. On the 30th at 4 P. M. brought the ship under close reefed top-sails until 6, when she came to the wind, having lost her sails. The sea and wind continued to increase, and at half-past 6 P. M. the sea was making a complete breach over her, washed away the quarter boat, and so strained the ship as to cause a leak under her starboard quarter. At 7 P. M. the top-masts went by the

* Lat. 9° 26½ N. long. 116° 51′ E.

board, being blown away—ship lying with lee rail under water until 1 A. M.; wind blowing a hurricane from N. E. Both pumps at work, the men obliged to be lashed to keep them agoing. The weather moderated at 1 A. M. for a short time, when the wind shifted to the N. W. and blew with still greater fury, and from thence suddenly shifted to S. W. at 3 A. M., blowing a complete hurricane, heavier than at any time before. At 6 A. M. the wind hauled round to S., and then to S. S. E., and it began to moderate at 8 A. M. During the gale the barometer ranged as follows:—

At noon of the 29th, (sea account,)	29.70
4 P. M. 30th	29.60
6 ,,	29.40
8 ,,	29.40
11 ,,	28.40
2 A. M.	28.30
3 ,,	28.20
Noon.	29.55

[*Singapore Free Press, Dec.* 24.

We may from these accounts deduce, I think fairly enough, that *La Magicienne* was dismasted in the N. W. quadrant of a storm of which the centre did not pass far from the Bombay Shoal. The frigate was probably drifted upon the shoal by a N. W. current occasioned by S. Westerly wind in the S. E. quadrant of the storm, or by a N. Westerly current, created by the S. E. wind in its N. Easterly quadrant, according as she was to the S. E. or the N. W. of the shoal. The last is the most probable, because the usual track lies within the shoal.

We may take the centre then, in the absence of better data, to have passed over the Bombay Shoal, and about noon on the 29th, and we find that at 3 A. M. on the 30th, civil time, it had passed the *St. Paul*, which ship might then be about in latitude 11° N., longitude 111° E.

This gives a track of N. 75° W. and S. 75° E., and a distance of 360 miles in the 15 hours, or 24 miles per hour. This rate of travelling is also higher than any we have yet obtained for either the China Seas or Bay of Bengal, but it is not an excessive one compared with those of the Western hemisphere, and if we admit the two ships to have experienced the same storm, which is quite as probable as that

there were two of them, we cannot be very far wrong as to this part of our estimate.

Another remark to be made, and it is one of much importance, is, that throughout this long period of years, this is the only instance in which we find a storm in so low a latitude as that of 11° N. the *Castlereagh's* Track, No. IX, being in about 12° N. The curves of those of the *Ariel* and *Moffatt*, if their storms reached so far, are only conjectural here, and reach the Coast of Cochin China in 12°, while the *Castle Huntley's* storm, Track No. XII, and the Calcutta *Thetis'* cross the usual route in 13°. We may then, as this space is as much crossed as any other part of the sea, infer, that when storms do occur so low as the latitudes of 10° or 11° N., they are of extreme violence, and perhaps (at least in this instance) also, they travel with great rapidity.

1841.

TRACK No. XXIX.

Hong Kong Tyfoon of 21*st July*, 1841.

In this year we have three remarkable tyfoons. Two in July, of which the centre passed close to Hong Kong, where great damage was done to the fleet lying there, and one which seems to have raged in about lat. 14° 20′ in November. Of this last I grieve to say, our records are very imperfect, though I personally applied again and again to parties, who could have afforded me such as would have enabled me to lay down a certain track for the storm.

The Hashmy's *Hurricane at Hong Kong, July* 1841.

21*st July*, 1841, *civil time.*

First part thick cloudy weather, with an increasing breeze from the N. W. and squally, glass falling; 4 A. M. hard gusts from Northward, made all snug, increasing with tremendous gusts, let go the sheet and veered to 60 fathoms on the bowers, a barque astern in the way. 11 A. M. the tyfoon at its height, Barometer 28.90, Symp. 28.65,

wind veering to the Eastward. The spray and mist of the sea only allowing us to see the mast-heads of the ships nearest to us, and completely concealing the hulls. Tyfoon drawing to the South and moderating, (time not mentioned,) several vessels dismasted and on shore; great mischief done at the town, *James Lang* and *Prince George* lost.

Tyfoon of 21st July.

The following Table is copied from the *Canton Register* That for the storm of the 26th, from the same source, I have given afterwards, to avoid confounding the documents relative to the two Storms:—

Wednesday the 21st.

8	0	A. M.	29.42	N. W. showery and fresh.
9	30	,,	29.32	N. W. Fresh wind.
10	0	,,	29.25	N. Rainy.
11	0	,,	29.15	N. Rainy and squally.
12	0	,,	29.03	N. E. Strong wind.
1	0	P. M.	28.96	N. E. Gusts.
2	0	,,	28.92	E. N. E. Hard gusts
3	0	,,	28.94	E.
3	30	,,	29.04	E.
4	0	,,	29.10	E. Misty.
5	0	,,	29.21	S. E. Rain and gusts.
6	0	,,	29.27	S. Hard puffs.
7	0	,,	29.31	S. Rain moderating.
8	0	,,	29.38	S. Rain moderating.
9	0	,,	29.45	S. Rain and high breeze.
10	0	,,	29.53	S. Rain and high breeze.
11	0	,,	29.54	S. Rain.
12	0	,,	26.54	S. Fresh breeze.

The wind from the North in the first tyfoon was remarkable for its strength and duration. The effect upon vegetation in Macao was very destructive, every thing appearing as if it had been scorched;

the air was filled with salt spray. Fortunately, the greater part of the rice crop in this vicinity had been harvested.

Captain Fraser, of the *Good Success,* in a letter dated 24th July, says, that on Thursday 22d, blowing strong from the S. S. E. they picked up a Portuguese, from whom they learned that he had belonged to the *Rose,* from the East Coast to Macao, which had foundered about three days before, at noon. *Grand Ladrone,* bearing N. ½ E. 29 miles, hove to and saved the crew of a junk. In the late severe weather we had not a tyfoon, being well to the Southward, but a heavy gale from S. W. with a tremendous sea.

The *Louisa* Cutter, bound to Hong Kong from Macao, left on 20th July, and at 10 P. M. the wind freshened till after midnight. On the 21st at daylight, it was blowing a gale from N. W. to N. N. W. By 3 P. M. the wind had veered to E. and S. E., and she was totally wrecked on the islands on the Western shore of the river. The Commodore and H. B. M. Commissioner, Mr. Elliott, who were passengers, narrowly escaped with their lives.

The ship *Ruby* on 15th July, 1841, was lying in Shih-poo harbour, on the East Coast of China, latitude 29° 2′ N., longitude 121° 40′ E. and had on that day at daylight Barometer falling. At 10, wind veering from N. E. to N. W. with heavy rain and a strong swell setting into the harbour. Made preparations for bad weather. Noon Barometer still falling, having sunk since the preceding evening from 29.80 to 29.20. P. M. weather finer, and at midnight quite fine and glass rising.

Abstract of the Log of the Brig KITTY, *Captain Willie, lying in Hong Kong Harbour, civil time.*

20*th July*, 1841.—Latterly light breezes, dark cloudy weather, and threatening appearance.

21*st July.*—Begins with the same. At 1h. 30m. strong gusts of wind from the Northward, with lightning in the West. Prepared for a tyfoon, wind N. N. Easterly, Barometer having fallen from 29.60 to 29.40. At 6h. 30m., heavy gusts from N. N. E. with rain, a tyfoon evidently approaching. Let go the best bower and veered to 90 fathoms. At 10 A. M., Barometer 29.10, blowing a furious hurricane from the

N. E. Let go sheet anchor, wind veering to the S. E. (time not noticed.) At 6 P. M. moderated to a gale from S. E., Barometer rising, and at midnight 29.40.

22*d July*.—From 1 to 6 gale moderate, but still in heavy gusts, at noon fine.

For this track I take the storm to have really veered from N. W. to S. E., as it did with the *Louisa* in the more open part of the river, and at Macao we find that the wind was at N. W., when the Barometer had already sunk to 29.32, which is far below the usual average at this season. At Hong Kong also it seems fairly enough to have begun at N. W., though in an enclosed anchorage with much high land to the N. E. of it, and beyond that on the continent of China, we must not look with any great nicety as to the exact point from which the wind may blow, particularly in the first part of a storm. A shift from N. W. to S. E. gives about a N. E. and S. W. track to the storm.

The bearing and distance of Shih-poo, where the *Ruby* was lying, from Macao, is about N. 40 or N. 42 E. 688 miles, and we see that a storm was probably passing from the N. E. to S. W., at 50 or 100 miles distance from her anchorage, at noon on the 15th. From noon 15th to noon 21st are six days, which time, if these storms were the same, it took to force its way over the high lands intervening between Shih-poo and Macao, which would give it 112 miles in 24 hours, or $4\frac{3}{4}$ miles per hour.

This is assuming it to have pursued a nearly straight course. If the mountain ranges forced it to take a curved track round the Coast, the rate of travelling would then be higher. We have, I think evidence enough, (see Third and Fifth Memoirs, *Journal of the Asiatic Society*, Vol. IX. p. 1049, and Vol. X. No. 121 1842, p. 20,) to shew that considerable retardation does occur, when storms meet with high land on their inland course, and thus there is no improbability in supposing the *Ruby's* Barometer to have been announcing to them the passage of the Macao storm.*

* I mention here a practical result, to which I may advert in another Memoir. If China was a country under European dominion, a telegraph might, when these storms strike the Eastern Coast, warn those on the Southern, that they were coming, and in India we might often attain the same advantage. Our children may see this done.

TRACK No. XXX. *Hong Kong Tyfoon of the 26th July,* 1841.

Log of the Ship HASHMY, *lying at Hong Kong, 26th July* 1841, *civil time.*

2 A. M. Wind freshening from N. N. E. with sudden gusts, and threatening appearance, made all snug and veered away. 9 A. M. Tyfoon with fearful gusts, wind shifting rapidly to E. and S. E., furious gusts from S. E. with sudden lulls, time not marked. Barometer 28.40. Symp. 28.20. Glasses rising rapidly. In the evening, the wind moderated with heavy rain, wind S. W., possibly the Monsoon. It is a singular circumstance in this Tyfoon, and shewing the small extent of the vortex, that a ship at anchor in the Lantao Passage, had the tyfoon commencing at North, and shifting round to the Westward, while with us at Hong Kong, at about 15 miles to the Eastward, the wind shifted by way of East. The vortex must then have been very close to us, and its effects could not have been felt any distance from the land, as a ship came in from the Southward the following day with her royal yards across.

Extract from the Log of the Brig KITTY, *Capt. Willie, lying in Hong Kong Harbour, civil time.*

25th July, 1841.—Latter part dull cloudy weather, 6 h. 30 m. threatening appearance in the S. E., 7h. heavy gusts, at midnight calm and fresh breezes N. E. and North.

26th July.—Begins with fresh breezes from the Northward with lightning in the N. N. W. At 1h. sudden strong gusts of wind varying from N. N. E. to N. N. W. At 2h. 30m. A. M. a strong tyfoon from N., attended with furious gusts of wind and constant heavy rain. At 3, veered away and made all snug. 6 A. M. wind shifted to N. E. At 8 A. M., wind E. S. E. Barometer 28.605. 9 A. M. wind S. E. At 10, South, tyfoon still blowing furiously with constant heavy rain. Noon, wind varying from S. E. to S. Barometer 28.605. 3 P. M. more moderate, but heavy gusts at times. The same to midnight, gusts from S. and S. E.

27th July.—Moderating from midnight.

The following is the Barometrical Table at Macao, which, by the way, does not begin soon enough, for, if possible, the fall should always be watched from the usual average till it again returns to the same point. There are many very interesting questions connected with the more or less gradual or sudden falls and rises of those instruments, which observers can much contribute to solve by attending to this remark:—

Barometrical Register at Macao, Monday, the 26th July, 1841.

" 7	30	A. M.	29.17	N. W. Rain.
9	0	,,	28.94	N. W. Heavy rain.
10	0	,,	28.94	W. High wind.
10	40		29.00	S. W. Rain and high wind.
11	0	,,	29.08	S. W. Ditto.
0	25	P. M.	29.25	S. W. Ditto.
1	0	,,	29.33	S. S. W. Moderating.
2	0	,,	29.37	S. Gusts.
3	0	,,	29.40	S. Less wind.
4	0	,,	29.44	S. Heavy rain.
5	0	,,	29.49	S. Ditto.
6	0	,,	29.53	S. Ditto from wind.
7	0	,,	29.58	S. High breeze
8	0	,,	29.58	S. Rain.
9	0	,,	29.64	S. Ditto.
10	0	,,	29.68	S. Ditto.
11	0	,,	29.70	S. Fresh breeze.
12	0	,,	29.70	S. Ditto.

The above Table shews, that the wind on the 2d day veered from N. round to W. and S. W., but at Whampoa and Hong Kong, we have been told it veered from N. round to E. S. E. and S. W., this would indicate, according to the theory of Redfield, that the vortex passed between Macao and Hong Kong.

That the centre was *at one time* between Hong Kong and the Lantao Passage, there can be no doubt; as also, that this small tyfoon, for it appears to have been of limited extent, was one coming up from the S. E.bE., or about from the Grand Lema to the centre of Lantao

Island, its right hand quadrants, close to the centre, taking Hong Kong, while the left hand ones at different distances struck the ship in the Lantao Passage and the town of Macao. I have therefore given it that track, as one tolerably well ascertained for the only part of its course of which we have any notice, and marked it as No. XXX upon our chart.

ARDASEER'S *Tyfoon of November*, 1841.

For this tyfoon, I have only, I regret to say, the following Documents:—

Abridged Log of the Barque ARIEL, *Captain J. Burt, reduced to civil time.*

The *Ariel* left Macao roads at noon, 16th November, 1841, with moderate North breezes and fine weather. P. M. to midnight wind North to 3 P. M., and N. E.bN., afterwards stood to S. and S. S. W., 6 and 7 knots, with fresh breezes and cloudy at midnight.

17*th November.*—4 A. M. strong breeze and thick weather, noon fresh gale, (about N. N. E.), and thick weather with a cross sea, latitude account 19° 31′ N., longitude 111° 51′ E. P. M. strong breeze N. N. E. and thick rainy weather, 8 strong gales, increasing to severe gale at midnight when under bare poles.

18*th November.*—3 A. M. wind marked North. 2h. 30m. gale moderating. Day-light moderate, noon latitude observation 16° 09′ N., longitude 110° 09′ E. In the last two days a current of 70 miles to the S. W.bS.

MACAO, 29*th July*, 1842.—The late arrivals report the occurrence of excessively heavy weather in the China Sea in the middle of November; the *Water Witch* encountered very hard gales for successive days, which nearly exhausted the crew; and the following extract of a letter from Capt. McIntyre, of the *Ardaseer*, will inform our readers of the narrow escape which that vessel had from foundering:—

'Left Singapore, Nov. 2, 1841; calm, anchored; noon on the 3d passed *Pedra Branca*; entered *Palawan Passage* on the 8th; wind shifted to the Eastward, determined to try the China Sea; passed *Pulo Supato* on the 11th with a S. W. gale; 13th, wind shifted to the

Northward; prepared for a gale; 14th and 15th, fine Northerly winds and clear weather. At midnight on the 16th, being then in latitude 14° 30′, longitude 114° 40′, the Barometer fell from 30 to 29. Sent down top-gallant yards, close-reefed and furled the top-sails, reefed and furled the main-sail. At 3 A. M., blowing a hurricane from the Northward; furled the fore-sail; spanker blown away; sea making a breach over all; 8 A. M., clouds rolling on, and the wind like the noise of thunder, sea confused and running mountains high; hove the ship to under bare poles; 9 A. M. thrown on our beam-ends, ship settling fast; and put the helm up, which she refused; little after 9, cut away the masts, and ship righted, sea at the time nearly swallowing us up; but the ship did not make an inch of water. Now under jury masts, and hope to make Manilla, as wind has been from the Westward for three days. Cabin filled with water; letters, chronometers, sextants, &c., all destroyed; cargo all right.' Ardaseer, at Sea, latitude 14° 50′, longitude 117° 15′.

SINGAPORE, 10*th December.*

Another Tyfoon.—On Tuesday afternoon the Clipper *Ardaseer*, which left this port for China on the 2d ult. returned into the roads under jury-masts, having on the 16th November experienced a severe tyfoon in the China seas, in latitude 14° 36′ North and longitude 14° 40′ East; during which she was compelled, as a last resort, to cut away all her masts. At 2 in the morning, the Barometer gave indications of the approaching tempest by falling from 30 to 29 inches, when thus forewarned, the hatches were battened down and every preparation made to meet the gale. In a few hours more, it was blowing a perfect hurricane, with the sea rising in pyramids in every direction, and making a clean breach over the vessel; which was now nearly on her beam ends, with both of her quarter boats carried away. They now attempted to heave over the guns, but could only succeed in getting one of them overboard, while they had to beat out the lee port to give a passage to the heavy body of water on the decks, tried to put the vessel before the wind, but she refused to answer her helm. At about half past 8 A. M., an awful gust accompanied by a tremendous sea threw the ship on her beam ends, the sea coming up to the coats of the masts, and the lee bulwarks, and part of the forecastle being

under water. The dead lights were beaten in, partly by the violence of the sea, so that the deck and cabins were covered with water, and she seemed to be going bodily down. With the utmost difficulty, owing to the fury of the blast, and the frightful sea that was breaking over her, the masts were at last cut away, and it appeared that nothing but their fortunately all going nearly at the same time could in so critical a moment have saved the vessel. Being now clear of her masts she gradually righted, and fortunately for all on board, kept quite tight during the strength of the gale. Captain McIntyre having rigged jury-masts, now endeavoured to make Manilla as the nearest port, continuing in that direction until the 23d November, when finding it impracticable to make head against the monsoon in the state to which the ship's rigging had been reduced, he bore up for this port.—*Free Press, Dec.* 9.

It appears from these documents that the *Ariel* was bringing with her a heavy monsoon gale, or it may have been ran into the outskirts of the *Ardaseer's* tyfoon, since her position at noon on the 17th was about 330 miles N. E.b.N. of that of the *Ardaseer on the* 16*th*, and in the 24 hours, the storm might have easily travelled a great part of this distance, though it seems to have been spent, or that the *Ariel.* ran so rapidly to the South, making 2½ degrees of Southing, between the 17th and 18th, that she escaped it altogether. I am, however, more inclined to think, it was not the storm which she felt, for she would in that case have had the wind more Easterly of North if it passed to the South, and more Westerly of North if it passed to the North of her. Could we have obtained any intermediate logs, we might perhaps have found here some evidence of one of these storms, confounding itself with the regular monsoon.

With respect to the track of the *Ardaseer's* tyfoon, we cannot even make a conjectural one from these accounts. All that we can be sure of, is, that its centre must have been very near to her when she had drifted into, say latitude 14° 20′ or 14° 10′, which in this longitude is not far from our Track No. XI., but here our present knowledge of this storm, which was experienced by at least three, if not four, vessels belonging to the port of Calcutta, ceases.

The iron steamer *Medusa* on the 13th and 14th November, encountered a severe gale from the N. E. off the Grand Ladrone, which drove

her down to Hainan North Bay, but this does not appear to have been any thing more than a monsoon gale. Her consort, the *Ariadne*, was compelled to bear up when near Manilla for want of fuel, and I believe experienced some bad weather, but her log has not reached me. The following is also a notice of a storm from the Singapore Free Press.

SINGAPORE.

On the evening of Sunday last, the signal was hoisted for a Steamer to the Eastward, and from the direction indicated, and the accounts that had been previously received of them, it was supposed to be one of the iron Steamers, either the *Ariadne* or *Medusa*, that started from this together for China on the 22d of last October. This conjecture proved correct, the steamer turning out to be the *Medusa*, Captain Hewett, which had been compelled to put back to this port from want of fuel; and the following are the particulars that have been communicated to us of the voyage. On the 2d November, when about 120 miles from Manilla, the *Ariadne* signalised that they had burnt out all their fuel, upon which Captain Hewett, who was the senior officer, hung out the signal for her to return to Singapore; and his own vessel having still sufficient fuel to carry him on to Manilla, he continued his course for that port, which he reached on the 3d Nov., but with scarce an ounce of fuel remaining. Having taken in here about 30 tons of wretched coal, and as much wood as she could stow away, even to filling the cabins with it, the *Medusa* got under steam again on the 9th, and on the 13th, was off the *Great Ladrone*, when they encountered a gale from the North East, and having again burnt out all their fuel, they were compelled to bear away on the following day. Here their compasses shifted two points to the Westward, and at daylight they found themselves in Hainan North Bay, in the midst of breakers and seas running mountains high; to escape from this dangerous situation they had recourse to breaking up the ship's bulwarks and every piece of available timber on board, and thus provided a sufficiency of fuel for two hours steaming, by which they escaped the perils that surrounded them, after they had nearly given

up all hopes. For five days they had no observation, but managed to run down into *Camaraigne Bay*, where they procured wood and water, but the former too green to burn. In a day or two afterwards they got amplitudes, and were enabled to rectify the error in the compasses, when they prosecuted the remainder of their voyage here in safety.

Captain Hewett of course expected to find that his consort had reached this port long before his own vessel—but she having neither arrived here, nor been otherwise heard of, apprehensions begin to be entertained of her ultimate safety.

The *Medusa* is now under orders to proceed to Maulmain, for which she will set out in the course of a few days.—*Ibid.*

The foregoing are all the records which I have hitherto obtained. I now proceed to offer a few deductions, practical and speculative, from them; the practical ones not as rules, but rather as hints for forming a judgment, and both as suggestions for those who may desire to aid in future researches in this important branch of science.

I commence with a tabular view of the tracks laid down in the Chart.

Tabular View of the Storm Tracks, laid down in the Chart.

No. of Track.	Dates.	Names.	Track of Storm.	Remarks.
I	1780 17th July, ..	H. C. S. London, ...	From N. 68 E. to S. 68 W.	Tyfoon.
II	1797 19th June, ..	H. C. S. Buccleugh,.. ..	——East to West, ...	Tyfoon.
III	1803 20th 23d Sept.	H. C. S. Coutts, Camden, &c.	——S.S.E. and E. to W.	Tyfoon, curved track, rate about 7 miles per hour.
IV	1803 20th 23d Sept.	H.C.S. Royal Geo. Warley, &c.	——N. 77 E. to S. 77 W.	Tyfoon, about 7 miles per hour.
V	1809 28th 29th Sept.	H. C. S. True Briton & Fleet,	——N. 60 E. to S. 60 W.	Tyfoon. True Briton founder-
VI	1810 29th 30th Sept.	H. C. S. Elphinstone & Fleet,	——N. 78 E. to S. 78 W.	Tyfoon. [ed.
VII	1812 8th & 9th Sept.	H. M. S. Theban and Fleet,	——S. 84 E. to N. 84 W.	Tyfoon.
VIII	1819 28th 29th Oct.	H. C. S. Minerva, ...	——S. 79 E. to N. 79 W.	Tyfoon.
IX	1820 29th Nov. ..	H. C. S. Lord Castlereagh,..	——East to West, ..	Tyfoon.
X	1821 18th 19th Oct.	H. C. S. General Kydd and General Harris,..	——N. 74 E. to S. 74 W.	Tyfoon.
XI	1822 14th 15th Sept.	H. C. S. Macqueen, ...	——S. 57 E. to N. 57 W.	Tyfoon.
XII	1826 25th 27th Sept.	H. C. S. Castle Huntley, ..	——S. 77 E. to N. 77 W.	Tyfoon, $7\frac{1}{2}$ miles per hour.
XIII	1829 9th Aug. ..	H. C. S. Bridgewater,.. ..	——East to West.	Tyfoon.
XIV	1829 8th & 9th Aug.	H. C. S. Charles Grant, Lady Melville, &c. ..	——S. 78 E. to N. 78 W.	Tyfoon.
XV	1831 23d Sept. ..	At Canton.	——N. 68 E. to S. 68 W.	Tyfoon.
XVI	1831 23d Oct. ..	At Manilla and the Panama's first storm, ..	——S. 68 E. N. 68 W...	Tyfoon.

No. of Track.	Dates.	Names.	Track of Storm.	Remarks.
XVII	1831 24th 25th Oct.	Panama's second storm, ..	From S. 45 E. N. 45 W.	
XVIII	1831 25th 26th Oct.	Fort William, ...	——N. 74 E. S. 74 W...	Perhaps Monsoon.
XIX	1832 3d August, ..	At Canton and Macao, ..	——East to West	Tyfoon.
XX	1832 22d 25th Oct.	Moffatt, ...	——N. 45 E. to S. 45 W.	Perhaps Monsoon.
XXI	1833 28th August, ..	Brigs Virginia and Bee, ..	——S. 40 E. to N. 40 W.	Tyfoon.
XXII	1833 12th October,	H. C. S. Lowther Castle, ..	——N. 12 E. to S. 12 W.	
XXIII	1835 3rd July, ..	Barque Troughton, ...	——S. 34 E. to N. 34 W.	
XXIV	1835 4th August, ..	H. M. S. Raleigh, ...	——S. 72 E. to N. 72 W.	
XXV	1837 16th 22d Nov.	Ariel and Vansittart, ...	——S. E. and curving to S. W. ..	Tyfoon and Monsoon.
XXVI	1839 22nd 24th Sept.	Calcutta Thetis, London	——S. 10 E. to N. 10 W.	Golconda foundered.
XXVII		Thetis and Golconda,..	——S. 78 E. to N. 78 W.	
XXVIII	1840 29th 30th Nov.	French Frigate Magicienne and St. Paul, ...	——S. 75 E. to N. 75 W.	Tyfoon, perhaps 24 miles per hour.
XXIX	1841 21st July, ..	Hong Kong Fleet, ...	——N. 45 E. to S. 45 W.	Tyfoon.
XXX	1841 26th July ..	Hong Kong Fleet, ...	——S. 56 E. to N. 56 W.	Tyfoon.

It appears from this table that—

1. If we class the storms according to the monsoons in which they occur, we shall find first as to the *times* of their occurrence.

N. E. Monsoon October to May.	Tyfoons seem to occur in October and November* only.
S. W. Monsoon May to October.	Tyfoons occur in all the months from June to October.

There is thus, we may say, but little chance of a violent storm from December to the end of May, *as far as our present knowledge extends*, and the disturbing force of the S. W. Monsoon against the regular N. E. trade seems to be a great cause, if not *the* cause, of these tempests. It is true that the N. E. Monsoon, (which is really the trade wind,) is considered to be fully established in November, at the surface of the earth, but we may suppose that there may be still some disturbing forces from the remains of the influences of the S. W. Monsoon acting in the higher regions. This sort of *vibrating* of some of the November storms, (*Vansittart's* and others,) to which I have alluded, may be noticed as affording some countenance to this view of the subject.

Considering these tables as to the probable tracks of the storms in the different months, we have the following results:—

			Average of Tracks.
June. ...	No. XI.	From East to West.	From East.
July. ...	,, I.	—— N. 68° E. to S. 68° W.	From between N. E. and S.E.bE.
	,, XXIII.	—— S. 34° E. to N. 34° W.	
	,, XXIX.	—— N. 45° E. to S. 45° W.	
	,, XXX.	—— S. 56° E. to N. 56° W.	
August.	No. XIII.	—— East to West.	From between East and S. 40° E.
	,, XIV.	—— S. 78° E. to N. 78° W.	
	,, XIX.	—— East to West.	
	,, XXI.	—— S. 40° E. to N. 40° W.	
	,, XXIX.	—— S. 78° E. to N. 72° W.	
Sept.	No. III.	—— S. S. E. and E. to W.	From between N. 60° E. and S. 10° E.
	,, IV.	—— N. 77° E. to S. 77° W.	
	,, V.	—— N. 60° E. to S. 60° W.	

* At Manilla they are *said* never to occur after the 30th November, the feast of St. Andrew, the patron saint of that city, which is celebrated with much pomp.

			Average of Tracks.
Sept.	,, VI.	From N. 78° E. to S. 78° W.	From between N. 60° E. and S. 10° E.
	,, VII.	—— S. 84° E. to N. 84° W.	
	,, XI.	—— S. 57° E. to N. 57° W.	
	,, XII.	—— S. 77° E. to N. 77° W.	
	,, XV.	—— N. 68° E. to S. 68° W.	
	,, XXVI.	—— S. 10° E. to N. 10° W.	
	,, XXVII.	—— S. 78° E. to N. 78° W.	
October.	No. VIII.	—— S. 79° E. to N. 79° W.	From between N. 12° E. and S. 45° E.
	,, X.	—— N. 74° E. to S. 74° W.	
	,, XVI.	—— S. 68° E. to N. 68° W.	
	,, XVII.	—— S. 45° E. to N. 45° W.	
	,, XVIII.	—— N. 74° E. to S. 74° W.	
	,, XX.	—— N. 45° E. to S. 45° W.	
	,, XXII.	—— N. 12° E. to S. 12° W.	
Nov.	No. IX.	—— East to West.	From between N. E. and S. E.
	,, XXV.	—— S. E. & to N. E. & S. W.	
	,, XXVIII.	—— S. 75° E. to N. 75° W.	

We must recollect in considering this, and all the other results which this Memoir offers, that we are very far from possessing all the data for the period of time over which it extends; as, up to the opening of the trade with China and the establishment of opium-clippers from Calcutta and Bombay to that country, the China Sea was in certain months rarely navigated by English ships, and of those few (Indian country ships, Americans and others,) which did navigate at those times, we have not a single record; all this should be duly borne in mind, and that the most we can expect are approximate results only from imperfect data. Another consideration also should not be overlooked, which is, that the tracks of the storms *seem* to be influenced by the quarter in which they arise, and that a ship off the Coast of Luconia, or in the S. E. part of the China Sea, in the angle formed by the Philippines and Palawan, may have more chances of a storm coming up from the Southward of East, than one between the Macclesfield Shoal and the Grand Ladrone. This consideration also should not be forgotten.

In my introductory notice I have remarked, that when we cannot prove the theory wholly by the evidence deduced from one storm, we may prove it in parts by the careful analysis of separate storms. I

now proceed to shew how far we have, as it appears to me, done this.

I should state here, that I have as carefully looked for contradictions as for confirmations of the usual law, and for tracks of storms from the Westward as well as from the Eastward; but in no instance have I been able to find data which would admit of this supposition, while all are, as it seems to me, easily and simply accounted for by assuming the rotation from left to right in the Northern hemisphere and tracks from some point to the Eastward of the meridian. Of the progression again, though we have not in the confined space and track which the China Sea affords, such direct evidence of it as we have in the Bay of Bengal, yet we have some, as in the case of the *Magicienne* and *St. Paul,* and the *Raleigh* which are direct enough, and we have again and again, which is perhaps of more importance, the increasing strength, varying direction, sudden changes, contrary shifts, and decreasing violence of the storms, which are exactly what *should* occur with a progressive whirlwind. The *Raleigh's* storm, so ably analysed by Mr. Redfield, and the Manilla and *Panama's* first storm are clear instances of well-ascertained progression, and the use of the hurricane card will shew that in every instance in which the direct evidence of ships in different positions is wanting, the indirect evidence which this demonstration furnishes, is almost equal to it, for it can be accounted for in no other way.

A third kind of proof may be deduced from those cases, (as that of the *Elphinstone,*) in which vessels, by bearing up, have evidently *chased* and ran into the more violent parts of their storms again, while others by lying to a little longer, have allowed it to leave them.

A fourth kind of proof is also worthy of notice. It will be seen by the log of the *Glatton,* p. 644, which ship was on the southern verge of H. M. S. *Theban's* Storm Track, No. VII., and was standing on, so as to cross the wake of it a few hours after the *Theban* and other vessels had been dismasted, that she crossed the "confused sea" which the passage of the vortex had left. This is always described as creating the awful "pyramidal" sea, a state of the elements of which no man who has not witnessed it can form any conception, and no doubt this confused sea is the remains of it. The same occurred, and most remarkably, to the London *Thetis,* as described in Captain Cass' very

able report in my Fourth Memoir.* This ship hove to very carefully on the southern verge of her storm, which was beyond question a rotatory one, and when it had passed her she bore up, and in crossing the track of the centre, she had the sea *heavier* than during the gale! Those who have remarked the effect of a whirlwind crossing a river or a lake, or that of a water spout passing near a ship, will recognise the value of this kind of proof. See also Col. Reid's Work, 2d edition, pp. 474 and 475.

Of the rates at which the storms travel we have very little evidence. In all the instances in which there appears to be any ground for a fair inference I have given it. From 7 to 24 miles per hour, appear to be at present the limits.

As to the circular, or nearly circular form of the vortices, we have I think, abundant evidence. I have again and again, from the logs, projected with every allowance the courses and drifts of the ships, and nothing but the circular theory would account for the winds. Where shifts of wind have taken place, as also where ships have been at a distance, or on opposite sides of a storm, the same rule holds good.

The law for the rotation in one direction, will also I think, be found always to have held good, and that the supposition of the rotation in a contrary course would wholly contradict our data.

One or two other peculiarities remain to be noticed, and the first of these is the occurrence of what may be called double storms, or two storms at the same time travelling on tracks converging towards each other. The *Golconda's* (two *Thetis'* Storm Tracks, No. XXVI. and XXVII.) are a remakable instance of this, and it is a contingency which should not be forgotten by the careful mariner in forming his judgment.

The next is the remarkable abatement in the violence of the weather which appears often to take place a few hours after the storm has commenced, but without any change of the wind or rise of the barometer, and only lasting an hour or two, when it comes on to blow again from the same quarter harder than ever. Old seamen are usually aware of this treacherous peculiarity, but it is one which may sometimes deceive, and thus deserves to be noticed.

* See also the Table at p. 691, 23d September, at midnight.

A third phænomenon is the very remarkable and dangerous one of a terrific tempest like that of the *Ariel,* without any corresponding depression of the Barometer or Simpiesometer. It is possible, however, that if this last instrument was not very carefully watched, it might have been *oscillating,* though not upon the whole falling, before the storm came on. Still the possibility of such a circumstance should warn the seaman to neglect no precaution.

My last practical remark refers to the highly serious danger arising from the current, or "storm wave," which seems to prevail in some of these tempests as far South as the Paracels, setting generally, it would appear, to the Westward, though in the case of the *General Harris* and *General Kyd* to the N. E. The logs of the *London,* p. 607, *Warley,* p. 612, *Scaleby Castle,* p. 628 and 632, and *Castle Huntley,* p. 651, afford ample proofs of this dangerous current; and I may mention in corroboration, that I have, in original documents and replies to a number of circulars addressed by me to the gentlemen of the H. C. Pilot service, at the mouth of the Hooghly, indubitable proof, that a current of the same kind running from two to five knots an hour, sets over the tails of the reefs to the Westward, in the Easterly and North-easterly hurricanes, at the head of the Bay of Bengal;* besides much evidence to shew, that the devastating inundations which occur along the Coast from the Megna to Coringa, are often caused by a true storm-wave breaking in suddenly, and sweeping every thing before it.

From the imperfect accounts which reach us from China, we may also I think gather, that something of the same kind occurs there.

Before I conclude, I must allude, as a question for research only, to another remarkable feature in these tracks, and indeed all the storm tracks we have yet traced out; which is this: If we look at the chart, we shall see that almost the whole of the storms seem to come in groups from certain quarters, and these quarters are those in which active or half-extinct volcanoes are situated.

Considering our chart in this view of the subject, we shall observe that, to commence from the Northward, six tracks, Nos. XXIX to XX appear to come from the North-eastward, or from the direction of the

* These will be published as soon as I can complete my Memoir on the Storms of the Sand Heads, and that on the (old) Storms of the Bay of Bengal.

great volcanic centre of the Japanese Archipelago. Between these we have two tracks, Nos. II and XIX, which may be supposed, if they originated at so great a distance, to have come from the active volcanoes at the North extremity of the Marianas, as may also Nos. XVIII and X.

We have then two groups from Nos. VIII to XXVII, which all pass over, if they do not arise from, active or half-extinct volcanoes; the North extremity of Luzon having the volcano of Camiguin and another yet active, and a chain of active or half-extinct ones extend through the almost unknown centre of that island.

We have next a group of three storms, No. XVI to XXI, which appear to issue from the Straits of Mindoro, the Eastern extremity of which has the great volcano of Albay, and to the South of it the half-extinct or active ones of Samar, Leyte and Mindanao; and lastly, we have a group of three tracks which originate at, or cross, the Island of Palawan, which having itself active volcanoes, has also to the South-eastward of it Mindanao and the Siao and Sangir chain of active volcanos.

It may be objected here that since the storms all come from between N. N. E. and S. S. E., and the whole sea is bounded to the Eastward by a volcanic chain at different distances, the storms must necessarily come from some part of it. Allowing all due weight to this objection, the coincidences I have shewn between the quarters or centres from which the storms seem to proceed, or at which they seem to originate, is worthy of attention, and I am not writing now to *prove* any thing, but to suggest points of enquiry for future observers.

I have already, p. 664 alluded to the well known fact at Manilla, that no hurricane* occurs without some volcanic action more or less violent being observed, and as the whole of the chain of the Philippines, from Mindanao to the Northern extreme is full of active, or partially active centres, far more so even than Java, there seems good ground for supposing some connection; but whether the volcanoes be the cause, or they are agitated by the effect of the atmospheric disturbance, we are as yet ignorant.

In the Bay of Bengal if the tracks of most of our storms be prolong-

* The Hurricanes are there distinguished from the monsoon gales by the term *Bagio*, an Indian (Tagaloc) word, signifying a turning gale, as hurricane does in the West Indies.

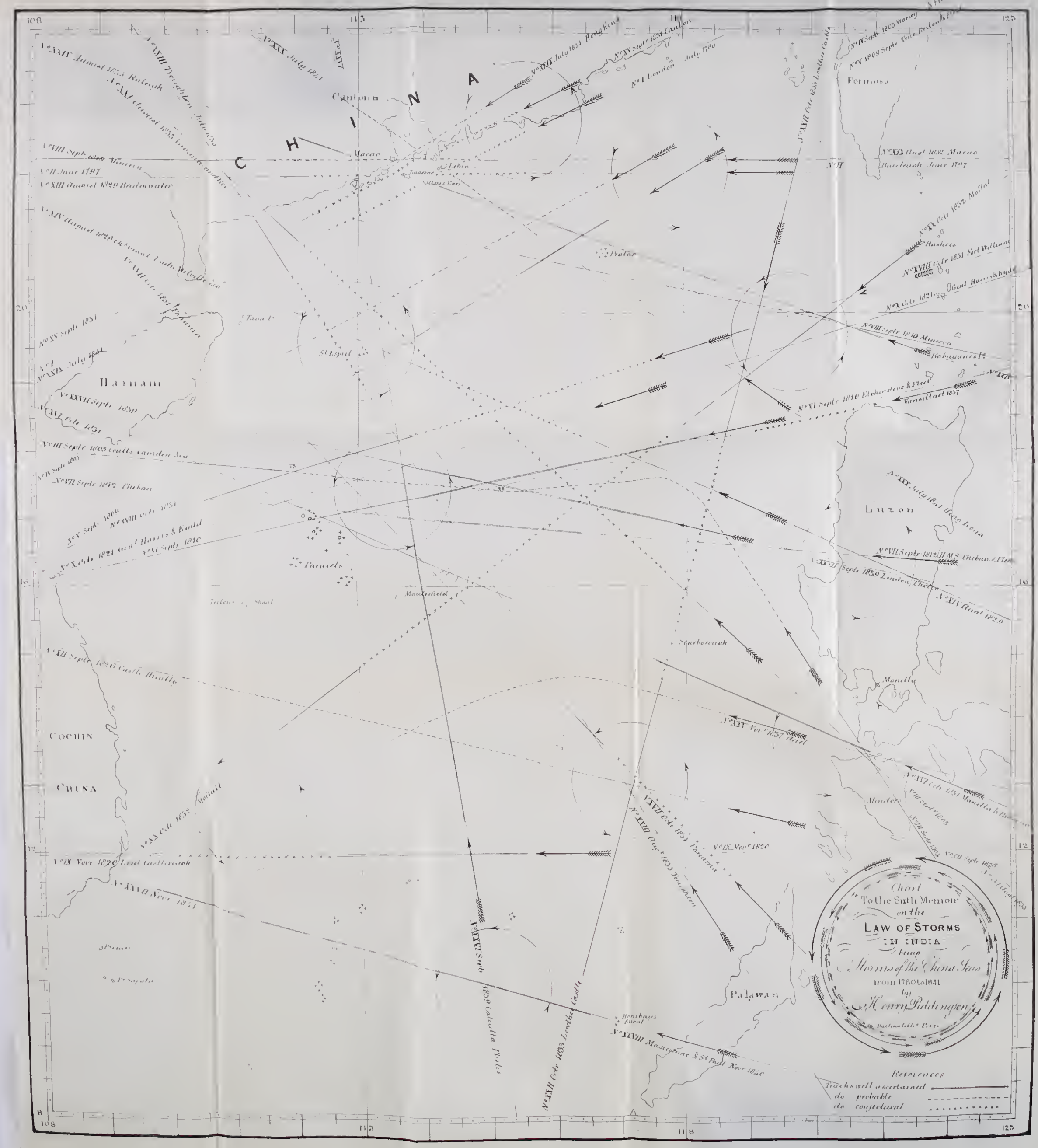


Chart
To the Sixth Memoir
on the
LAW OF STORMS
IN INDIA
being
Storms of the China Seas
from 1780 to 1841
by
Henry Piddington
Hainan
Luzon
Formosa
Palawan
COCHIN
CHINA
Macao
Canton
Manilla
Tarnarels
Macclesfield
Scarborough
References
Tracks well ascertained
do probable
do conjectural

ed to the S. E., they will all be seen as it were to start from near the yet active volcanic centre of Barren Island! and some of the old storms which I have traced, certainly do the same. Again, if we look at Mr. Redfield's chart of the West India hurricanes, we shall find them also mostly beginning about the volcanic Leeward Islands. The neighbourhood of Bourbon and Mauritius, and the Timor Sea, where hurricanes seem very prevalent, are all instances of this sort of relation, whatever it may be, if it really exists.

CONCLUSION.

Authors are not allowed to speak of the merits of their works, but I know of no rule which prevents them from pointing out their faults. I would notice here then, that one fault at least of this Memoir is *incompleteness* of information. For this I am not responsible, * for I have assuredly spared no pains to render it as complete as possible; but the seaman and the man of science, and every friend to humanity, will I hope not fail to see and to point out, from what has been here accomplished with imperfect data, how much more might be done by more accurate and detailed accounts, and the continued publication of them. It cannot be too often repeated, and therefore I again repeat it here, that we are yet in the infancy of our researches; that valuable as are the practical uses to which they have been turned, we know not yet to what greater results they may lead us; and that, moreover, no one can know *what* the value of any apparently insignificant instance or fact relative to storms may be, which he may have it in his power to communicate.

* To cite one instance (for those acquainted with the Hydrographical History of the China Seas, must think it strange that I have not referred more frequently to the logs of the H. C. Survey Vessels, which for at least ten or twelve years were employed there.) I must state that though three or four applications were made to a party who must be in possession of the logs of one of these vessels, not even a reply was ever received!

Observations on the Herat Astrolabe, described in No. 118, *of the Journal. By the Rev.* J. S. Pratt, *Chaplain to the Right Rev. the Lord Bishop of Calcutta.*

I feel ashamed that I should have kept the brass Astrolabe you lent me so long, without having more to say upon it than I have. But, I am sorry to tell you, that incessant occupation has prevented my giving any time to its examination since the first day that I brought it home. On that day I measured some of the arcs, and tried to discover the use of the curves drawn upon the smooth face, but could not ascertain their use. In fact, it would require a long and close examination and measurement of these instruments, and an intimate acquaintance with the Hindoo and Arabic methods of calculation and observation, which I have no time to acquire, I regret to say—to lead one to indulge any hope of discovering the use and method of handling these Astrolabes. The difficulties that stand in the way of discovering the method of using these instruments, and the object for which they were constructed, seem to be the following :—

1. An ignorance, an entire ignorance of the object in view; though it seems most probable, that the object was to calculate the dates of festivals.

2. The want of a complete knowledge of the *principles* upon which the instruments were constructed.

3. An ignorance of the extent to which the numerical constants used in the application of their principles were erroneous.

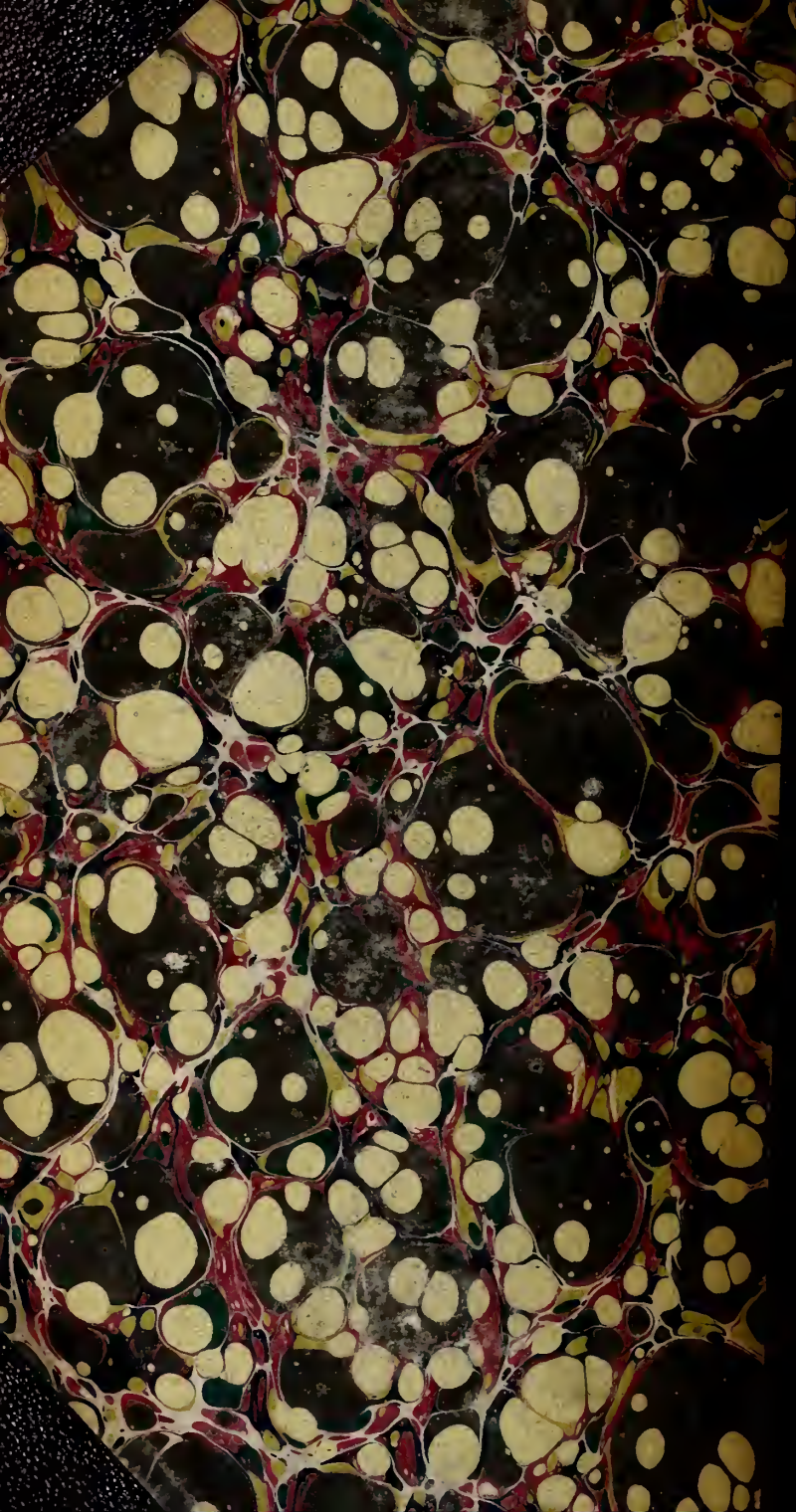
4. The imperfection of workmanship in the instrument itself.

Perhaps I may presume to say, that the author of the communication to the Asiatic Society's Journal, No. CXVIII, entitled "A description of a Persian Astrolabe," meaning, I believe, the one I now return to you, does not attempt to give an explanation of the use of the curve lines, which intersect the circular arcs concentric with the instrument itself. Indeed, these lines are wrongly drawn in the diagram. It seems most probable, that they serve some important office in the calculations and observations for which the instrument was designed; and

should therefore be carefully examined, and their law of position discovered, to serve as a clue to their use.

Perhaps I may be allowed to say, that from what I have seen or read of the Astronomy of the Hindoos, and also of the Arabs, my own mind has been brought to the conviction, that their knowledge has been very much over-rated. Their knowledge appears to have shewn itself chiefly in the calculation of eclipses; and the phenomena of eclipses being striking and capable of observation by persons of all descriptions, the powers of calculation which have led to their prediction, have excited admiration, and raised the fame of the calculators. But the calculation of eclipses is not so very profound a branch of Astronomy, at least when carried only to the degree of accuracy shewn in Hindoo calculations, as to entitle the Hindoo astronomers to any great fame, except as being attentive observers and moderate geometers. But as to any physical laws, they seem to have been profoundly ignorant, and therefore could not have been *mathematical* or "physical" astronomers. Ancient observations are of great value in Physical Astronomy; for instance, the mere fact of an eclipse having been seen by the Chaldeans on a certain day, and at a certain hour in the year B. C. 720, has led modern astronomers to the demonstrable conclusion, that the length of the mean day has not changed by a hundred and fifteenth part of a second of time within the last twenty-five centuries. This physical fact, of great importance in all theories regarding terrestrial heat, and therefore in the researches of Physical Geology, could not have been demonstrated without the *observed* fact of the Chaldean astronomers. But this observation, (though important in its historical consequences,) does not argue any great power and knowledge in the observers. All *facts* of observation are in a similar way valuable, but do not necessarily prove that the observers are profound philosophers. In this way, by confounding the *value* of *observations* with the *powers necessary* for conducting and recording them, it occurs to me, that the Hindoo and Arabian astronomers have received, in general estimation, far too high a name.

Bishop's Palace, Calcutta, August 11*th*, 1842.

P. S.—I might as well add, that the object of my making these remarks on the degree of importance *to be* attached to Arabic and Hindoo astronomy is to shew, that researches in this branch of science will be interesting to the astronomical historian or antiquary, rather than to the astronomer.

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